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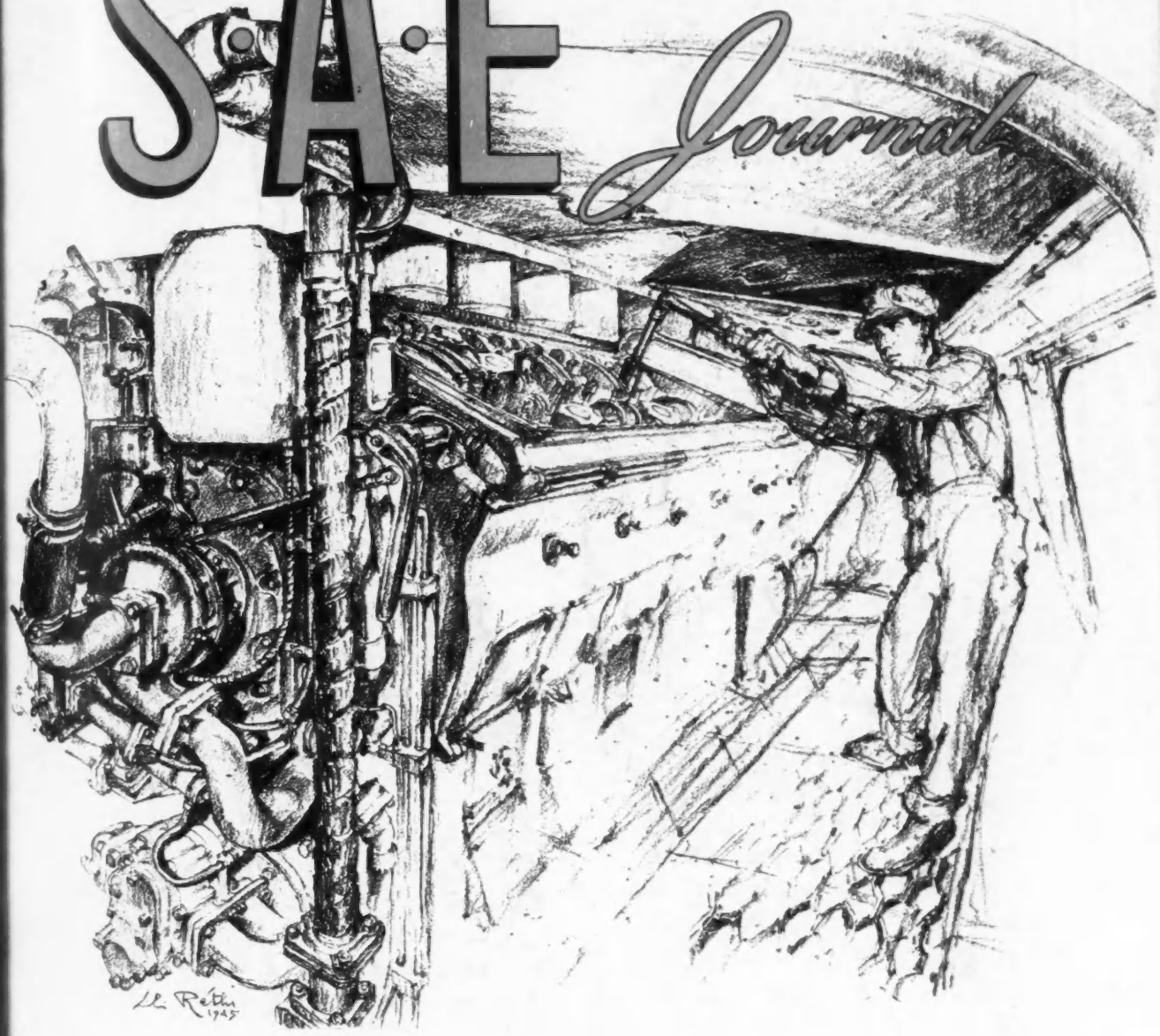

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Effect of Post-War Automotive Practices on Ignition Performance —H. L. Hartzell
Post-War Bus Design for City Transportation —L. J. Fageol

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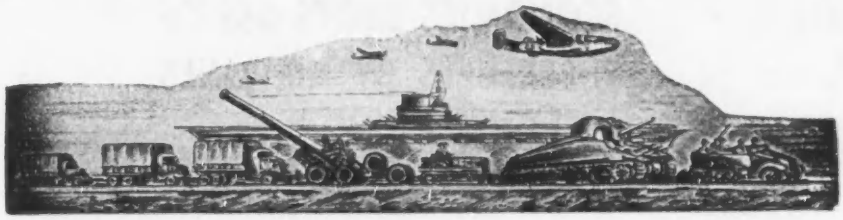

News of the **AUGUST** *Issue*

By Norman G. Shidle

More About Balance

EVERYTHING is against getting excited and thrilled about achievement of balance. Perfection has about it an aroma of Nirvana which doesn't arouse the man of action. Unbalance so obviously cries for action, that it automatically interests, and often inspires.

The greater necessity for action in preserving balance is much less obvious. A smooth-running engine, an on-schedule production department, an error-free magazine all seem to be effortless results. Harmony, peace, and balance do not force themselves into one's consciousness.

Only constant activity will maintain balance in an operation or an organization – and keep it dynamic. Sound policies and established procedures are but the basis for successfully balanced action. In the human relationships of business, particularly, never-flagging attention is the catalyst which keeps policies and procedures alive in hearts as well as heads. A mediocre procedure carried on as a living program will bring better results than a perfect procedure left to lose itself in the weeds of indifference.

Unsung bulwarks of industrial progress are those men in high positions and low who get as much excited about keeping things right-side up as about rescuing non-swimmers from capsized boats. Glory belonged to the fabled boy who put his finger in the dyke; an inner sense of a job well done satisfied the engineer who designed the next-door dyke which didn't leak.

To keep a car under control on a tortuous hill is even better than swinging it successfully out of danger which might have been avoided.

In the very nature of things, balance-preservers will never share the spotlight of public acclaim with the more dramatic trouble-shooters. Their contributions to industry, though, are dynamic and powerful; their satisfactions and rewards high.

Probable Course of War Foretold by Metallurgy

ENGINEERINGWISE, the course of war is read as easily as an open book. From first chapter to last the plot is apparent, and those who frame the structure for world peace could learn from engineers and metallurgists how to foretell, perhaps to avoid, conflict.

"A nation's ability to wage war can be measured by its capacity to produce and to fabricate metals," Col. J. H. Frye, of Office, Chief of Ordnance, will say in August *SAE Journal*. Col. Frye will be writing of the metallurgy of enemy automotive equipment.

History so far as Germany is concerned, conjecture in the case of Japan, yet engineeringwise the course of war teaches plain lessons. If at any time any nation begins to accumulate stock piles of metal, trains scrap dealers to be selective, confiscates metal toys, and demonstrates a trading interest in metallic elements, the objective probably is war, however distant.

War's Early Start

Engineeringwise, Col. Frye will suggest, Germany and Japan began World War II prior to 1933. Their patterns of conquest evidently were governed more by metallurgy than by ideology. Similarly, the patterns of their defeat are marked by the loss of satellite countries conquered for purposes of production of metals. Germany was doomed the moment she lost these sources of supply. Japan appears to be doomed the moment she loses her sources, or contacts with them. Germany's position was stronger. She was the center of land hauls from sources. Japan must carry by water, and any interruption means disaster.

Germany imported two-thirds of her steel from Sweden, France, and Luxembourg. Her manganese came from Czechoslovakia, Italy, Roumania, Russia; her nickel from Norway, Finland, Italy, Greece; her aluminum from France, Yugoslavia, Italy, Hungary; her copper from Yugoslavia, Finland, Turkey; her molybdenum from Norway, Finland, the Balkans. By stranglehold or conquest she had to gain control of these sources.

Accumulating Metals

Japan began before 1937, getting nickel from the Philippines and the Celebes, manganese and chromium from Manchuria and North China, bauxite from Netherlands East Indies and Malay, copper wherever it could be found. Here again stranglehold or conquest was essential to supplies of war materiel.

Germany began by accumulating large stockpiles, teaching dealers to select and to sort scrap, subsidizing foreign mining properties to gain possession of ore, exchanging finished exports for raw materials. Japan also followed the stockpile route; expanded steel production at home, in Manchuria, Korea, North China; seized what she could not buy; took possession when resistance appeared. Both countries enforced strict laws governing utilization of metals, even confiscated metal toys.

Centuries of Value

War values of iron and steel have not changed greatly since the Assyrian Army, about 700 B.C., equipped itself with iron weapons. Caesar found the iron currency of tribes in Britain helpful to forging arms; the Norsemen prized iron cooking utensils more than gold and jewels when they made their raids. And the success with which they made war use of metals has measured the success of armies in the field these many centuries.

Germany, as expected, improved her arms as the war progressed. Japan, less progressive engineeringwise, seems to have stockpiled arms and automotive equipment of better than a decade ago, and only belatedly is catching up.

Cockpit Design Poses Problems

ENGINEERING problem of substantial proportions and importance is that of designing aircraft cockpits so that pilots may have adequate vision, comfort, convenience, and control. Final analysis shows that planes must be flown to be productive, and that the flying depends primarily upon the ease and efficiency with which pilots exercise control.

As G. F. Beal, of Northwest Airlines, Inc., will point out in August *SAE Journal*, the problem would be simplified were pilots design engineers, or if design engineers had been pilots, or if both engineers and pilots somehow were more standardized in their experiences, backgrounds, impressions, sizes, shapes, and ideas about cockpits.

Multiple Problems

Mr. Beal will break the problem into component parts, such as cockpit window layout; instrument panel arrangement; cockpit lighting, heating, and ventilation; pilot comfort; and type, arrangement, and accessibility of controls. While this breakdown fails to resolve the multiple problem, it does establish the point of view that the cockpit is a workshop wherein a skilled workman is expected to produce quality results, and any arrangement which handicaps him should be corrected.

Human in Control

Regardless how expensive and complex the airplane, Mr. Beal will comment, it becomes productive only when in operation. It can operate only when and while a man in the pilot's seat properly handles various levers, cranks, valves, switches, and other devices, and does his important job efficiently, correctly, and quickly.

Recalling the statements of design engineers that there are just as many ideas about cockpit layout as there are pilots, Mr. Beal will report results of a survey of pilot opinion made in conjunction with the Air Line Pilots' Association.

Pilot's Own Recommendations

Judging by this survey, consensus of the pilots' own recommendations calls for such cockpit design details as:

- Straight, not curved, window surfaces.
- Birdproof windshields equipped for defrosting.
- Flight instruments functionally grouped for quick and accurate reading from the pilot's seat.
- Duplicate flight instruments on larger planes.
- Indirect lighting, but not fluorescent until improved.
- Pilot's seats adjustable fore-and-aft, up-and-down.
- Better heating and ventilating systems.
- Accessible controls, designed and spaced for use with minimum hand movement and without confusion.

Many of these requirements, Mr. Beal will conclude, call for prolonged engineering study and solution of complicated problems, but their attainment promises to pay rich dividends in the safety and dependability of scheduled air transportation.

ECONOMICS LIMITS USE OF SUPERFUELS BY AIR LINES

SUPERFUELS appear to be having more success in the headlines than in use. While the public may be intrigued by the thought of gasolines four times more powerful, airline engineers, keeping a weather eye on economics, are disinclined to accept fuels so tremendously souped-up as to menace the mechanical strength and durability of engines.

Practical approach will be presented in August *SAE Journal* by Earle A. Ryder, of Pratt & Whitney Aircraft, Division of United Aircraft Corp. He will explain that the superfuels which are high in antiknock values might pay out on long-distance, nonstop flights, but that for short-run operations the garden variety 91-octane gasoline will do.

Future engines may use superfuels if they are designed and built to produce lower fuel consumption when cruising, Mr. Ryder will say, but in the meantime engineers are interested more in resistance to knocking than in any other fuel characteristic. He will present some charts designed to permit of fuel evaluation under operating conditions, and he will list major desirable characteristics of aircraft fuels, such as:

- Fewest grades; recognized specifications.
- Little as possible lead, or none.
- Noncorrosive to metal, rubber.
- Adequate storage stability.
- Well-balanced volatility.
- Maximum calorific power.
- Lowest price.
- Highest knock value.
- Standardized physical properties.

Automatic Controls Help Pilots to Use Dual Superchargers

APPLICATION of automatic controls to aircraft engines having two engine-driven superchargers constitutes one effective aid to full engine efficiency without requiring constant attention of the pilot.

The application will be described in August *SAE Journal* by John Dolza, of Allison Division, General Motors Corp., as comprising one supercharger driven at constant ratio, an auxiliary supercharger driven by fluid coupling with variable degree of slip. Engine power control maintains selected manifold pressure by automatically operating the carburetor throttle. The altitude-responsive auxiliary supercharger control operates the scoop of the hydraulic coupling.

Mr. Dolza will explain how it is possible to limit the manifold pressure below detonation independently of the pilot's selected pressure, and to control manifold pressure 2 in. of mercury below borderline detonation on engines lacking interior aftercoolers.

The Cover

THE diesel engine plays an ever-increasing role in production of power for self-propelled vehicles. Dramatically displayed on this month's cover is its application as motive power for speedy, streamlined railroad passenger trains.

Resting in Washington for adjustment only a few hours between runs, this Baltimore & Ohio diesel was sketched by Artist Lili Rethi to symbolize the concept behind one of SAE's most dynamic Activities.

Apply Bonded Rubber Dampers to Overcome Torsional Vibration

PERTINENT example of interdependence, even of techniques and materials, is the utilization of a vegetable product, natural rubber, to cure torsional vibration in a metallic assembly, the diesel engine. Torsional vibration damper service appears to be a job for which synthetic rubber is not yet satisfactory. Application is so critical as to demand dependable technology in incorporating specific qualities, such as resistance to temperature changes, adhesion to metal surfaces, high fatigue strength, and other attributes developed by rubber compounding.

Helpful Accessory

While the torsional vibration damper is an accessory, still it contributes to the length and efficiency of service of a diesel installation, T. H. Peirce, of H. A. King Co., will say in August *SAE Journal*. Mr. Peirce will describe the application of bonded rubber dampers to cure the effects of torsional vibration, particularly that twisting action exerted upon the crankshaft by the conflicting forces of compression and expansion strokes.

Each case of torsional vibration is a problem in itself, Mr. Peirce will explain, and the solution depends upon prolonged engineering studies to ascertain the periods and amplitudes of vibration and to design proper dampers. In some cases dampers are used to quiet gear rattles and other noises which develop when the diesel and accessories begin to function.

When properly designed, the damper will work in combination with the crankshaft to give continuous damping at all speeds in the operating range. To accomplish such goals, however, is no simple matter, for, before the basic design can be determined, it is necessary to consider such factors as the moment of inertia of all reciprocating parts and equivalent length of crankshaft between crankpins.

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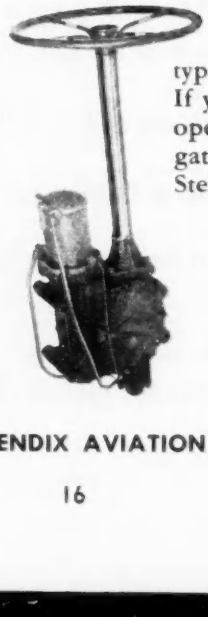

Bendix Power Steering shown in combination with Ross steering gear.

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at DETROIT WAR MATERIEL Meeting

By W. F. Sherman

DETROIT – With sessions full of varied interest, the War Materiel Meeting, held under auspices of the Passenger Car Activity of the Detroit Section on June 4 at the Book-Cadillac Hotel, had definite military flavor in three afternoon papers which were presented as reports of Ordnance officers from combat areas, under sponsorship of the Passenger Car Activity. Other sessions on materials and passenger car bodies completed the day.

The dinner meeting, including a report on body engineering and standards programs of the Society by Walter T. Fishleigh, consulting engineer, was under the chairmanship of Ronald J. Waterbury, chairman of the Detroit Section. Clarence W. Avery, president of the Murray Corp. of America, was toastmaster.

Charles L. McCuen, vice-president in charge of engineering, General Motors Corp., presented an evaluation of the wartime efforts of the engineer in the automotive industry and cited numerous cases in which automotive organizations have pooled their technical data, engineering knowledge, production techniques and trade secrets.

The effect of such wartime cooperation will be interesting to watch on post-war cars, Mr. McCuen declared, adding "we may be well along in the post-war era before the different makes of cars have any distinctive design features . . . it probably will take several years before you engineers become sufficiently aloof once more so the peddlers again can assume their avocation as purveyors of grapevine information."

Col. J. M. Colby, Chief, Development Division, Office of Chief of Ordnance, presiding, introduced in turn Lt.-Col. E. H. Holtzkemper, Chief, Transport Vehicle Branch; Major J. J. Robson, Development Division, Rubber Branch, Chief, Wheeled Vehicle Section, and Major A. E. Cleveland, Development Division, Transport Vehicle Branch. These officers, under the policy of Major-Gen. G. M. Barnes, Chief of the Research and Development Service of the Ordnance Department, have spent a portion of their time in the field to observe use of the products they helped to develop.

Col. Holtzkemper, having served as an observer in both the North African and European theaters of action, declared that the first reaction upon entering a combat theater is surprise at the tremendous number of vehicles required. In September of last year, while transport vehicles were still streaming into ETO, there were approximately 210,000 trucks, 99,000 trailers, 7,600 semi-trailers, 4,000 motorcycles and 550 passenger cars in the area. Forty-five per cent of the trucks were 2½-ton 6x6; 28% were ¼-ton 4x4; 15% were ¾-ton 4x4; the remainder were of ten other standard sizes.

Vehicles in the NATO had actual mileages from 0 to 60,000 miles most of them near the top figure, although the anticipated life originally had been two years, or 24,000 miles. Many failures at the high mileage were apparent, although replacement was considered normal at the mileages encountered. Vehicles in ETO had mileages from 0 to 15,000 miles, mostly about 10,000 miles. Only most glaring deficiencies were evident in these, Col. Holtzkemper declared. Serious overloading of vehicles was common, many times because of necessity and the following range of loads were observed:

Truck, 2½-ton, 6x6, Cargo – 2¼ tons to 7½ tons

Truck, 2½-ton, 6x6, Cargo 15 ft – 4½ tons to 6¾ tons

Truck, 2½-ton, 6x6, Cargo 17 ft – 4½ tons to 9¾ tons

Truck, 4-ton, 6x6, Cargo – 6 tons to 8¼ tons

Truck, 7½-ton, 6x6, Prime Mover – 8¼ tons to 9¼ tons

Truck, 10-ton, 6x4, Cargo – 7¾ tons to 10½ tons

A thorough observer of operating demands, Col. Holtzkemper was able to report many specific suggestions that make his presentation worthy of close study by designers.

A chance to make a second report on "Rubber at War" was accorded Major Robson in his appearance, inasmuch as he and Lt.-Col. B. J. Lemon had presented to SAE previously the story of the development of synthetic rubber tires for Army vehicles. In combat, he declared, double payload is common practice. Roads and service conditions

LOCAL
War Emergency Meeting

are almost unbelievably severe and runs at high speeds for long distances are frequent. Nevertheless, no heat failures were encountered in synthetic tires. Bruise breaks were the most common cause of failure. Transport vehicles with heavy tractor-trailer units encountered tread tracking in synthetic tires, particularly in hot weather. Numerous photographs illustrated Major Robson's assertion that probably the principal remaining problem with synthetic rubber in Army use is susceptibility to tread chipping and cracking.

Special flexible 11.00-18 tires with thin treads are light carcasses employed on the amphibian DUKW did a very good job, even though they operate at very low pressures on sandy beaches and carry substantial loads under severe conditions.

The special combat tires developed for armored wheeled vehicles performed admirably even when deflated by gun fire or shell fragments.

GR-S (Buna type) synthetic in tubes tore badly when punctured and was hard to repair, so Butyl synthetic rubber is now used exclusively. It holds air better than the other type besides eliminating the deficiencies.

Other details of Major Robson's paper covered rubber tracks, bogie tires, half-tracks and maintenance conditions.

Two or three isolated spots in the largest single battle area the world has ever seen constitute the Southwest Pacific area, Major Cleveland declared. A wide variety of soil and coral and other factors affecting operations are encountered in this theater, however. Corrosion problems may be considered as a first place candidate for generalization about such operating conditions, he declared. His presentation was a summary of a great variety of such corrosion problems. Not only does paint scale off so 14-gage sheet steel will rust through in 24 hours, but even glass is subject to fungus growth and subsequent optical distortion.

Crediting automobile and truck manufacturers for remarkable achievements in quickly supplying the special needs of the Army for unheard of automotive equipment, the major recounted some of the work achieved by the "Ordnance-Industry Team," as recently defined by Lt.-Gen. Levin H. Campbell, Jr., Chief of Ordnance. Based upon his personal observations, he listed these developments – some of which have been accomplished:

Waterproofed and mudproofed brakes;

Permanent type fording equipment;

Increased cross country mud ability for wheeled vehicles;

More driver comfort;

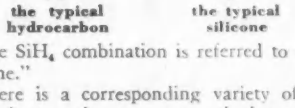
"A" frames, in kit form, readily attachable to all cargo vehicles equipped with winches to assist in unloading, and

A method for quickly attaching pontoons. It was suggested that these pontoons be inflated by pumping in exhaust gas.

Major Cleveland credited the American Ordnance maintenance mechanic as competent and "remarkably ingenious inventor. He must be to survive," the author remarked.

Traction and flotation are an important problem in conducting operations, Major Cleveland reported.

The chemical structure of silicones was outlined by W. T. Eveleth, General Electric Co., Insulation Materials Division, in his talk on "Silicones – Their Engineering Aspects and Fields of Application." He pictured them as being roughly the same as hydrocarbons, except that silicon is present instead of the carbon atom. Comparing the CH_4 structure to the silicone structure, he pictured the two as in the accompanying illustrations.



the typical hydrocarbon **the typical silicone**

The SiH_4 combination is referred to as "a silicone."

There is a corresponding variety of silicones just as there are many hydrocarbons. Some have oxygen included just as the hydrocarbon group with oxygen included constitutes an alcohol in that family. Relating the behavior of silicones, he said that one of the physical properties is heat resistance. Silicone rubbers differ from natural rubber or other synthetics in that, while they will bounce, they can be pulled apart, some acting like clay and some like stringy chewing gum. Having been pulled apart, however, they can be kneaded together again.

Several of these materials were on display, including display boards which had many temperature-resistant gaskets and other finished products.

Also a highlight of the materials session during the morning program was the paper by Robert D. Heidenreich, Physics Division, Dow Chemical Co. He discussed the use of the electron microscope in investigations of surface structure. In the past few years this form of microscopy has advanced rapidly in this country in quite diverse fields, including bacteriology, geology, colloids, plastics, metals, etc., each particular branch requiring development of suitable techniques of specimen preparation. He discussed in detail one technique applicable to the study of surfaces of rigid solids. This is the technique which makes use of surface replicas, consisting of a thin film of polystyrene-silica which is examined by transmission in the electron microscope. These replicas will reproduce the structures in the original surface down to a size of about 75 Angstrom units.

Such replicas can be used, he said, in metallographic studies and he provided much practical information on the preparation of specimens for such studies.

Limitations on the use of the electron microscope are resolving power and penetration, the author told his audience. The resolving power of the microscope is a consequence, he said, of the very short wave length of the electrons employed. The wave length associated with a stream of 50 kv electrons is only 5 x 10 to the minus tenth power of a centimeter, or one two billionths of a centimeter. This compares with 4000 to 7000 Angstrom units for visible light, or a ratio of one to from 80,000 to 140,000.

"The limiting resolution for the present instruments is about 30 Angstrom units, although there is not complete agreement as to its actual value or method of determination," he said. The resolution is dependent upon the details if electron scattering by the specimen and so will vary from one type of material to another. For the silicon replicas he used as examples, the resolution of the combined technique was estimated to be about 75 Angstrom units.

Low penetrating power of the electron beam has been found to be the greatest limitation in the application of the instrument. Electrons are efficiently scattered by matter with the result that only small thicknesses can be used in transmission specimens. The range of specimen thickness that can be used depends upon the energy of the electron beam and the atomic number of the atoms of which the specimen is comprised.

For 60 kv electrons, organic materials up to perhaps 700 Angstrom units can be used effectively, while for a metal the value might be 100-200 Angstrom units. The electron bombardment generally gives rise to considerable heat in the specimen and in some cases may cause chemical or physical changes, he pointed out.

Of particular interest was Dr. Heidenreich's discussion of the investigations into the nature of adhesion between various metals and bonding materials such as cycleweld cements. He declared that "since the structure of the interface is apparently of importance in bonding, it follows that investigations into this type of phenomena for cements, paints, lacquers, and so forth might yield worthwhile information."

The coffee speaker, Edward J. Jeffries, Jr., mayor of Detroit, gave the SAE members a detailed and intimate picture of the progress being made in planning for postwar transportation in Detroit. He declared that, whereas the job after World War I had been to build good roads to "get the farmer out of the mud," the problem now is to get the urbanite out of congestion that is so great that it interferes with the proper use of transportation equipment. He described plans for a crosstown industrial highway linked to the Willow Run expressway, and plans for several other arterial highways in the city, including a combination automobile roadway and a center mall rail system.

Detroit's airport problem, seemingly on the verge of solution, inasmuch as an industrial group had offered a few days earlier to contribute land for construction of an airport, also was discussed by the Mayor. He declared that the city soon would be served by all but one of the major airlines and will be better served by air transport than by any of the other means of transportation. He described additional efforts being made to get railroads to coordinate their facilities and also touched on plans for obtaining new equipment for mass transportation in Detroit. He concluded with the request that Detroit engineers offer their suggestions for improvements in transportation.

SUCCESS of the Detroit War Materiel Meeting, June 4, was largely due to members of the Detroit Section's new Governing Board who worked closely with the SAE Aircraft and Aircraft Powerplants Meetings Committees on the detailed planning.

Under the leadership of Chairman R. J. Waterbury, Chevrolet Motor Division – Secretary Frank S. Spring, Hudson Motor Car Co.; Robert Insley, Continental Motors Corp. and John S. Squiers, Briggs Mfg. Co., Chevrolet Motor Division, aeronautic chairman and vice-chairman, respectively; R. F. Sanders, Meetings Operations, and E. F. Petsch, Timken-Detroit Axle Co., Reception Chairman, were among the most active in planning the all-day meeting.

The special committee consisted of J. G. Wood, Chevrolet Motor Division; Ralph N. DuBois, Packard Motor Car Co., and Messrs. Spring and Waterbury.

This was the first administrative task of the new 1945-46 Detroit Section Governing Board.

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Washington – F. H. Fielding
Western Michigan – Irving E. Aske
Wichita – No Appointment
Colorado Group – No Appointment
Mohawk-Hudson Group – No Appointment
Peoria – No Appointment
Salt Lake Group – No Appointment
Twin City Group – No Appointment
Spokane Group – L. P. Johnson

Expect Conference in Canada To Speed Standards Unification

HIGH hopes are held by members of the SAE Screw Threads Division and other leading screw thread experts of the United States, Canada, and Great Britain that the August-September Conference on Unification of Engineering Standards, Ottawa, Canada, will bring unification of American-British-Canadian thread standards nearer to a reality.

The Ottawa conference is being held under the auspices of the Combined Production and Resources Board, of which William L. Batt is the U. S. Deputy member. Members of the steering committee are Elmer J. Bryant, Greenfield Tap & Die Corp. and Ronald Allwork, CPRB, representing the United States; Stanley J. Harley, Coventry Gauge & Tool Co., Ltd., and Lord Pentland, representing the United Kingdom; and James G. Morrow, Steel Co. of Canada, Ltd. and James H. Boyd, representing Canada. Messrs. Batt, Bryant, Harley and Morrow are SAE members. Thus the Society is represented in the highest administrative bracket of this project in Great Britain and Canada, as well as in the United States.

Nonunification of British and American screw threads "added at least $100,000,000 to the cost of the war, and has caused incalculable production and repair delays," Mr. Batt estimated recently.

Existing screw thread differences stem from heterogeneous designs developed during the early nineteenth century when the great era of mechanical achievement was getting under way in England and America. In 1841, Sir Joseph Whitworth set up the British standard which now bears his name. But in 1864, William Sellers developed a screw thread that was easier to produce in the United States than the Whitworth.

One of the basic problems to be resolved by the Ottawa conference is the British 55-deg versus the American 60-deg thread forms. Back in April, 1861, the Franklin Institute of Philadelphia began an investigation which developed a series of threads with the 60-deg form, and this was then variously known as the Franklin Institute, Sellers, and United States thread series. It is now known as the American (National) Coarse Series. In 1905, a series of finer pitches with the 60-deg angle were developed by the Association of Licensed Automobile Manufacturers, the basis of the present SAE series. This was revised, as required by the industry, and specified external and internal screw threads from ¼ to ¾ in. diameter.

The ALAM standard was adopted and extended to 1½ in. diameter in June 1911 by the Society of Automobile Engineers as the SAE Screw Standard. In January 1915 (SAE Transactions, 1915, p. 16) this series was again extended and referred to as the SAE Coarse series, and an SAE Fine series for 1⅛ in. diameter and larger adopted with 16 threads per in. In March 1918 the SAE Fine series was extended downward from 1½ to ¼ in. diameters inclusive and adopted primarily for aeronautic use.

The present Coarse (NC) series was the former United States Standard; The Fine (NF) series was the previous SAE Coarse series extended to include the numbered sizes; and the present SAE Extra Fine (EF) series was the former SAE Fine series.

The 8, 12 and 16 threads per in. series were adopted by the Society in January 1935 in order to avoid inconsistencies in practice and to provide adequate screw thread specifications for all uses in the automotive industries. In certain sizes these threads duplicate the present regular series but in such cases the specifications are identical.

The 16 Thread Series, Class 2 for screws and nuts, and sizes 4¼ to 6 in. inclusive in the Class 3 tables for screws and nuts, were added to the SAE Standard in January 1942.

In the Extra Fine series the pitch for the 1⅛ in. diameter and larger sizes is 16 threads per in., the detail dimensions being given in the tables of the 16 pitch threads for the corresponding classes of fit.

A machine screw series of smaller diameters was early recommended by the American Society of Mechanical Engineers.

Further unification of the various American threads series was undertaken in 1918 when the National Screw Thread Commission was established by Act of Congress to establish standard threads for the various governmental services with the SAE and ASTM the industry representatives – written into the law.

As industrial expansion took place in new fields, such as aeronautics, for example, the value of special threads – Acme, improved buttress forms, and instrument series – became apparent for special applications. Demands of war forced widespread adoption of these, review of which will be an important function of the Ottawa Conference.

The war also brought about the Truncated Whitworth form as a production compromise particularly urgent in artillery parts for lend lease production for England. This form is interchangeable with the standard Whitworth, and enabled the manufacture of vast quantities of war materiel for both American and Allied war materiel by U. S. war plants.

The Ottawa Conference is the third of a series of important coordinated events toward the unification of British, Canadian, and American screw thread standards. The first was the August-September, 1944, Joint U. S.-Canada Screw Thread Mission conferences in England. The second was a conference in New York last November reporting the progress and the assignment of specific tasks to a number of subcommittees.

British Use SAE Form

THE SAE standard form for plotting hardenability curves has been reproduced, with permission, by George H. Alexander Machinery, Ltd., Birmingham, England. The firm supplies these charts to their customers, users of testing machinery.

SAE Membership Has Doubled Since 1940

MEMBERSHIP applications received by SAE Sections have established a new high for the fifth consecutive year, totalling 2472 for the 1944-45 Section year ending June 1. As a result, SAE membership also has reached a new high, 12,881 as of June 1, 1945, or doubled that of 6189 on June 1, 1940.

Membership applications received by Section years follow:

1944-1945	2472
1943-1944	2464
1942-1943	2229
1941-1942	1349
1940-1941	1157

Twenty SAE Sections exceeded membership application quotas for 1944-45, led by Mid-Continent, with 189%; Southern California, with 180%; and Northwest and Washington, tied with 156%. All SAE Groups equaled or exceeded quotas, Spokane leading with 333%.

AMS Distribution Hits High

A TOTAL of 3,116,571 SAE Aeronautical Materials Specifications (AMS) has been distributed by the Society from May, 1940, to May 23, 1945.

These are individual sheet specifications covering aircraft materials and were developed by the Materials & Processes Coordinating Subdivision, SAE Aeronautics Division. Head of this extensive project is J. B. Johnson, subdivision chairman, who is on the engineering staff of the Army Air Forces, Materials & Services Command, Wright Field. The distribution, by periods, was as follows:

1940 (8 months)	243,600
1941	246,168
1942	790,412
1943	989,294
1944	651,000
1945 (to May 24)	196,097

I&S Top Group Scans Reports

NEW data on steel hardenability bands, news that specifications have been started for metal-joining materials, and a report that SAE specifications for automotive-type, heat-treatable steel castings have nearly been completed were among the scors of reports from its 10 panels and 16 subdivisions considered by the executive committee of the Iron & Steel Subdivision of the SAE Standards Committee at its May 14 meeting in Detroit.

The executive committee approved a recommendation to include in the booklet already jointly published by SAE and AISI more than 20 additional tentative standard hardenability bands for steels in the 2000, 3000, 4000, and 9000 series of standard compositions.

The metal-joining materials standards, recently started by Subdivision VI, eventually is expected to comprise a new section in the SAE Handbook, the executive committee learned.

Other subdivisions brought reports to the executive group on a great variety of prob-

Rambling Throug Sec

ENGINEERING problems involved in making equipment to produce the desired physiological effects on the human body are manifold, and they require a close liaison with medical science, according to Col. W. Randolph Lovelace, II, chief, Aero-Medical Laboratory, Air Technical Service Command . . . **WASHINGTON SECTIONITES** at their May 8 meeting were told by Col. Lovelace of equipment which has been developed to counteract some of the effects of gravity on the body of the pilot during turns . . . This equipment, which permits plane operation under conditions and at rates which were not previously possible, has saved lives of many aviators forced down at sea, it was learned . . .

Present at the joint PEORIA SECTION-ASME Central Illinois Section meeting May 11, at which Dr. Sanford A. Moss, General Electric Co., discussed the history of gas turbine development, were (l. to r.): J. M. Davies, chairman of the SAE Peoria Section; Dr. Moss; C. G. A. Rosen, technical chairman; Prof. H. F. Moore, University of Illinois; and Robert Mees, chairman of the ASME Central Illinois Section

Host to the **OREGON SECTION** at its May 25 meeting was the Portland Traction Co., to which members flocked to tour the company's Shop Division and inspect all repair and maintenance facilities as well as special machinery developed at the plant . . . Preceding this 2-hr trip were a buffet luncheon and business session at which new Section officers were introduced . . .

SAE Oregon Section has arranged with Meier & Frank Co., Portland, to use their address and service as the permanent address of the Section for emergency use, and is now listed as follows:

1417 N. W. Everett
Phone Broadway 4411
Station 673

War machines have been given prolonged life by bearings and machine parts made from powdered metal, A. J. Langhammer, president, Amplex Division, Chrysler Corp., revealed at the May 3 meeting of **SOUTHERN CALIFORNIA SECTION,** where he predicted the same effect will apply to the post-war automobile . . . Since the powdered metal parts are 25 to 30% porous, he said, they permit an injection of oil which makes them self-lubricating and prolongs their life indefinitely . . . they also have the advantages of low-cost manufacturing and greater exactitude in design than is possible with machined parts . . .

Cerrobend, a comparatively new material made from lead, tin, bismuth and cadmium, which has many uses for aircraft manufacture and maintenance, was described at the May 15 luncheon meeting of the **SAN DIEGO UNIT** of Southern

Section Reports

California Section by Kenneth C. Cathcart, Lockheed Aircraft Corp. . . . Its low melting point of 160 F and its property of remaining in the fluid stage below 200 F make Cerrobend exceptionally easy to handle, the speaker declared, and its elongation has been measured at more than 200% under extreme conditions . . . Visual aids helped to make this meeting, which was sponsored by Ryan Aeronautical Co., particularly enlightening to the 45 persons who attended . . .

Over 200 enthusiasts of jet and rocket propulsion came to San Diego's May 25 meeting to hear Dr. Martin Summerfield, Aerojet Engineering Corp., expound on the applications of rocket propulsion . . . Summing up the value of the rocket, Dr. Summerfield explained that it is useful when large forces are to be applied for short durations where the overall weight of the prime mover is to be minimized . . . Showing of the Bell "Airacomet" movie realistically dramatized his story . . .

Dinner and non-technical discussion closed a successful season for **PHILADELPHIA SECTION** May 9, with members' wives adding a gala touch to the evening . . . Educational experience was in store for all when Dr. Gerald Wendt, consulting editor in science and technology for *Time, Life* and *Fortune* magazines, reviewed outstanding achievements in the fields of aviation, electronics, housing and medicine . . . Predicting changes in the next decade comparable in their effect on humanity to those of the past 50 years, Dr. Wendt took his audience behind the scenes and showed them many interesting details of recent developments, including several of the new silicone plastics . . .

Sentiment blended with cordiality provided the fare for **CANADIAN SECTION'S** May 18 meeting, with retiring Chairman William A. Wecker handing the gavel over to his successor, George J. Beattie, who in turn presented "Chairman Bill" with a suitably engraved gold wristwatch as a token of the Section's esteem . . . and with SAE Past-President William J. Davidson and Col. R. S. McLaughlin, senior Canadian member of the Society (1909) paying homage to the great accomplishments of automotive engineers . . . More than 204 spectators taxed the capacity of Genosha Hotel's ballroom in Oshawa to watch these proceedings and to hear J. Lance Rumble, technical adviser to the Commanding General, Northwest Service Command, U. S. A., describe the construction of the Alaska Highway and Canal, built at the strategic moment when the Japanese were at the gates of Alaska and their submarines threatened to sever the water route to the Yukon, Alaska and the Aleutians . . . Mr. Rumble also amused his audience with a humorous satire on post-war car design and price trends, and the industry's ante bellum planning in general . . .

New horizons in the field of stress analysis were pointed out by R. G. Anderson, Aluminum Co. of America, to the keenly interested group of **INDIANA SECTION** members May 10, who admitted the speaker's methods were far ahead of their own laboratory practices . . . Mr. Anderson declared that while the trend toward lighter parts and units has led to increased life and resistance to strain, the ideal to which we must strive for further improvement in design is stress analysis of parts under operating conditions . . . He explained the way he applies strain gages and other apparatus . . .

Movies and a talk on the current tire situation by Walter C. Nelson, manager, Firestone Stores, comprised events at **COLORADO GROUP'S** May 15 meeting . . . One film, "Making Seamless Steel Tubes," was a 35-min educational sound picture, and the other depicted truck operation on the Alcan Highway . . .

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One of the largest **METROPOLITAN SECTION** meetings on record was held May 24 when Benson Hamlin, Bell Aircraft Corp. development engineer, presented his paper on "Jet Propulsion" . . . The meeting was sponsored by the Section's diesel engineering vice-chairman, Allison L. Bayles . . . Nearly 800 members and their guests turned out for the meeting . . .

South America is the biggest potential market in the world for goods marked "made in the U. S.," J. F. Winchester, Standard Oil Co. of N. J., told **CINCINNATI SECTION** members May 22 . . . Recently returned from a Government-sponsored tour of Brazil, the speaker warned that American industry would have to lower production costs of exports if we wish to avoid becoming a second-rate source of supply . . . He advocated wise leadership to promote friendlier relations with South America after the war . . .

lems and projects, among which were recommendations dealing with the possibility of adding to SAE specifications certain carbon and alloy steels which now are coming into general use as a result of experience born of war restrictions.

SAE Publishes Handbook

SAE Handbook, 1945 Edition, now being distributed to Members, presents new SAE Standards on electrical equipment and non-metallic materials, and revised SAE Standards on gasoline engines, iron and steel, lighting, non-ferrous metals, and parts and fittings.

The new standards cover starting motor and generator curves, generator and starter mountings, starter pinion and ring gears, and windshield wiper hose. Revised standards include methods of determining steel hardenability, steel hardness conversion numbers, automotive gray iron castings, NE steels, automobile wiring, insulated cable, and license plate lamps.

Earlier Editions Superseded

The 620 pages of text contain all SAE official current standards and recommended practices, except those which are aeronautical, plus general data having important bearing upon both standards and recommended practices. The new volume supersedes all earlier editions.

To the extent of a limited supply, the Handbook will be made available to non-members of the Society at $5 per copy. Orders may be placed with Society of Automotive Engineers, 29 West 39th St., New York 18, N. Y.

M. LeROY STONER, who had been connected with General Motors' Eastern Aircraft Division for the past two and one-half years, was recently appointed a staff engineer, aeronautical department, SAE Headquarters in New York City, by J. D. Redding, manager of the aeronautical department. Mr. Stoner will coordinate the work of the Committees of the Accessories & Equipment Subdivision, the Propeller Subdivision, and the Special Aircraft Projects Subdivision of the Aeronautical Division of the SAE Standards Committee.

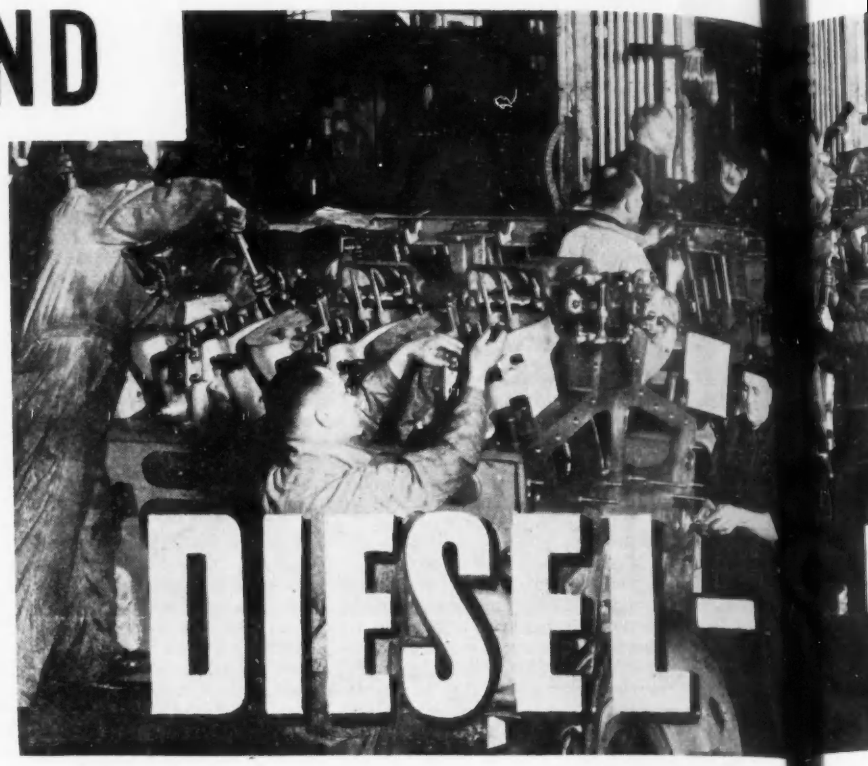
While at Eastern Aircraft, Mr. Stoner had advanced from standards engineer to chief of standards, the position he held at the time of his resignation.

His engineering career began in 1939 with Standard Equipment Co., after studying at the University of Wisconsin and at McKinley, a technical college. Shortly thereafter he joined Link-Belt Speeder Corp., where he designed parts for various types of hoisting equipment. Expanding into the field of aircraft-equipment design, Mr. Stoner served as assistant project engineer for Globe Aircraft Corp. in 1941, and a year later as lead engineer with Curtiss-Wright Corp.

He became a junior member of the Society in 1942.

CLEVELAND Meeting

Features Diesels, Oils, and Engine Accessories



by Merrell A. Wood, Jr.

MORE than a thousand SAE members and guests attended at least some portion of the Cleveland Section SAE War Emergency Meeting on Diesel-Fuels and Lubricants held May 17 at the Carter Hotel – and the Rainbow Ballroom was taxed to capacity when SAE Past-President C. F. Kettering talked on "The Future Responsibility of the Engineer."

Superchargers, bearings, lubricating oils, and moving pictures of combustion within a diesel engine cylinder, taken at the rate of 10,000 frames per sec., held the rapt attention of the large groups that attended the various sessions during the day.

The meeting was under the direction of A. O. Willey, Lubri-Zol Corp., who was appointed general chairman by Cleveland Section Chairman R. S. Huxtable. Mr. Willey was assisted by R. F. Steeneck, Fafnir Bearing Corp., and A. E. Wilson, Pesco Products Co., of the Arrangements Committee; H. W. Luetkemeyer, Cleveland Graphite Bronze Co., chairman of the Reception Committee, and M. A. Wood, Jr., Cleveland Diesel Engine Division, GMC, publicity.

Mr. Willey opened the morning session by introducing chairman of the Diesel Session, W. A. Parrish, Superior Engine Division, National Supply Co. Featured during the Diesel Session were R. J. S. Pigott, Gulf Research & Development Co., and Mr. Luetkemeyer.

Mr. Pigott, in his paper "Various Types of Compressors for Supercharging" stated, "the supercharger has become an essential for gasoline engines in aviation because the loss of power due to altitude, and consequent lowering of ambient barometer, is much more pronounced than for any ground vehicle. In order to fool the engine into thinking it is still working at ground level, a supercharger with a compression ratio of 8.5 to 1 must be provided to do the 'kidding' at 50,000 ft. altitude." He explained the characteristics of all major current types of superchargers and stated that the two major classes of superchargers are centrifugal or axial turbine types, and the positive displacement type. He pointed out that the positive displacement blowers could again be divided into adiabatic compression and back-flow compression types.

During the discussion period which followed, W. H. Doyle of the Caterpillar Tractor Co., said that as the speed of positive pressure blowers increased, the noise resulting therefrom increased. He also stated he would prefer to use the term "normalizing" in place of "supercharging" in aircraft terminology. The discussion was closed with the observation that "the success of a compressor application in its final stages depends on the engine designer to a great degree due to the manner in which he adapts the compressor to his engine."

An interesting paper, "Bearing Developments Up-to-Date," was presented by Mr. Luetkemeyer, in which he said "constantly increasing demands for life and output of automotive equipment have placed bearings in a critical position from time to time. However, today we feel that we of the bearing industry have materials which are satisfactory up to the film strength of oil, provided other conditions are not excessive."

The author said, "Bearing life is characterized by three qualities, generally speaking: (1) resistance to fatigue, (2) surface action and (3) corrosion or wear." He stated, "you will note that we have placed fatigue first. This has been done because in the main, the design of a machine determines what this requirement will be. Second, surface action is inherent in the material selected under the heading of fatigue. These surface actions are affected by hardness, machinability, weldability, imbeddability and wettability.

"We believe" he continued, "these terms to be self-explanatory, except for the last two. Imbeddability refers to the ability of the material to receive into itself foreign material in such a fashion that the particle will not disrupt normal contact area or the oil film; and wettability refers to the ability of a lubricant to cling to the surface. The third, corrosion or wear, is generally a combination of chemical and mechanical removal of the bearing surface, but either phenomenon may occur separately. We believe that much erosion has been mistaken for corrosion."

Mr. Luetkemeyer showed some interesting slides illustrating various engine faults in bearing design, such as elaborate oil grooves used in early bearings, as well as slides showing bearings that have failed due to the three qualities stated above.

In the discussion period which followed, A. Underwood, Research Division, General Motors Corp., told of an engine, manufactured by a well-known company and purchased by a farmer, which was placed on display by the company due to the astounding number of hours which it had operated successfully. It seems that the bearings supplied with this engine were of the type utilizing elaborate oil grooves and that evidently the bearings had failed in service and had been rebabbitted by the farmer with no grooves present whatever. He pointed out that, evidently, after rebabbitting these bearings and eliminating the intricate oil grooves, no further bearing trouble was encountered.

The afternoon sessions were again opened by Mr. Willey, who introduced the chairman of the Fuels & Lubricants Session, Max M. Roensch, Cleveland Graphite Bronze Co.

Lt.-Com. H. F. Galindo, USNR, Officer in Charge, Petroleum Section, Navy Bureau of Ships, presented a paper entitled "Navy

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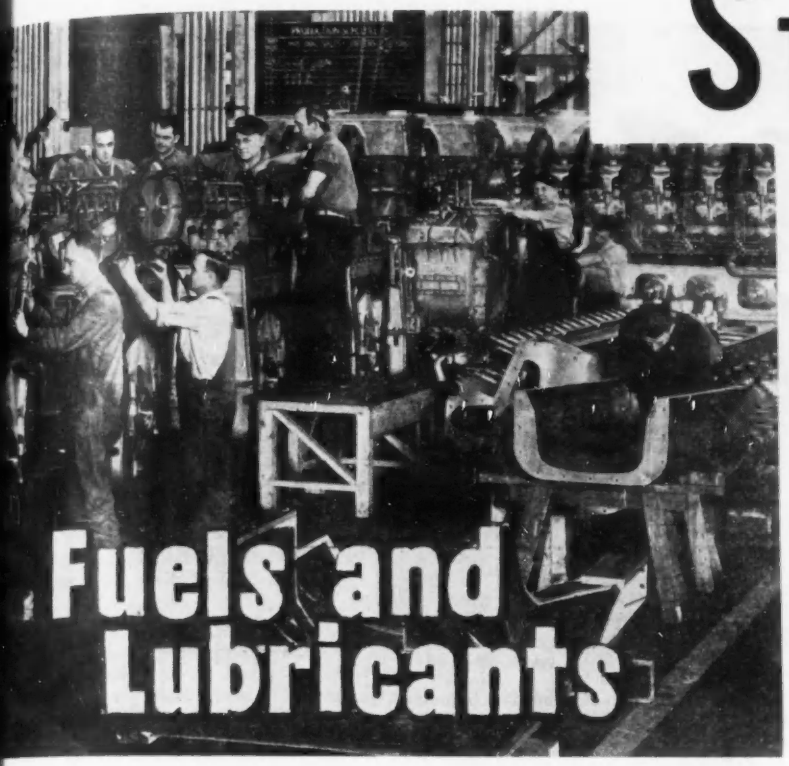
Local
War Emergency Meeting



St. Louis Meeting

Highlights Operations Of Diesel Powerplants

by J. E. Jury
and C. C. Butterworth

"THE Care and Feeding of Diesel Engines" might well have been the appellation given the special one-day wartime Diesel-Fuels & Lubricants sessions held at St. Louis, May 15. About 150 key engineers of the petroleum and diesel industries gathered in the Chase Hotel to hear and discuss papers dealing with compression-ignition engines and with their fuels.

Under the capable direction of George C. Davies, section chairman, the arrangements committee swung into action immediately on receipt of news that the St. Louis Section had been selected to hold one of the all-day meetings necessitated by the ODT ban on national meetings.

At the morning Diesel Session, presided over by Rudolph H. Schneider, Busch-Sulzer Bros. Diesel Engine Co., Nicholas Fodor of the Diesel Engineering & Mfg. Co., traced the development of injection systems and lifted a corner of the curtain hiding future developments in these all-important components of the compression-ignition engine. C. F. Harms, Elliott Co., in a paper prepared by himself and R. W. McLaughlin of the same company, discussed the exhaust-driven supercharger.

"Any discussion of the turbo-supercharger involves not only a consideration of the turbine itself, but of the blower and engine too," explained Mr. Harms. "The turbine absorbs a portion of the engine exhaust power, not all of which would otherwise go to waste, and the blower enables the engine to deliver more power both to the crankshaft and to the turbine." Stating that the supercharger and its associated mechanisms might be considered as the "tail on a dog," the author followed his thesis to the logical conclusion where the tail really does wag the dog; and the engine, instead of being the source of power, serves merely as an accessory to an exhaust-driven supercharger which is then called a gas turbine.

Present-day applications of various supercharging systems have permitted power output increases as great as 50 per cent for existing engine designs without exceeding allowable operating temperatures and mechanical loading.

After a recess during which speakers and honor guests attended a luncheon with the Section officers, the afternoon Engine Operation Symposium got under way under the chairmanship of Leroy W. Griffith, Shell Oil Co.

F. G. Shoemaker, General Motors Detroit Diesel Engine Division, led off the discussion on diesel economics by pointing out that basically the economic formula for automotive transportation is identical with that of other profit-making enterprises, namely to get the maximum work done at the lowest possible cost. In this formula, the expense for fuel occupies third place, accounting for as much as 22 per cent of total operating costs. Obviously the diesel, with its low fuel costs, is in an advantageous position as regards automotive transportation, but this position can only be maintained if the development of fuels matches the developments in engines. Late developments in small diesels have permitted it to compete strongly with the gasoline engine as motive power for highway vehicles.

Revealing that refiners had only recently been forced to extensive research on automotive diesel fuels, W. M. Holaday and W. S. Mount of Socony-Vacuum Oil Co., emphasized that the production of gasoline has lately been the controlling factor in diesel fuels. The latter have been greatly affected by cracking processes. Forecasting higher prices for diesel fuels, the authors explained that the increasing competition for straight run distillate stocks would probably require some compromise among refiners and engine designers.

That lubricating oils have come in for a good share of attention was brought out in discussing the latest results gained from the use of additives, such as oxidation inhibitors and detergents.

In the final paper of the technical sessions, Bryan Park, Central Greyhound Lines, told the audience that the diesel engine has often suffered as a result of over-enthusiasm on the part of its proponents. "Though it has proved its worth in stationary installations," he said, "there is no assurance that the diesel will do everything under any conditions. Proper study must be made prior to and after installation if every diesel user is to be satisfied." Mr. Park then listed types of engine failures which he felt could be corrected through more careful analysis of operating problems and specific applications. In the discussion period on these papers, Mr. Shoemaker summarized the manufacturers' feelings jocosely when he stated that the average automotive diesel manufacturer feels that he is successful when he is shipping engines to his customers faster than the latter are shipping the engines back to him.

Climax of the day was reached at the dinner meeting at which Jose E. Jury, president of Business Collaborators, Inc., was toastmaster. Taking an early article by William Hazlett Upson, speaker for the evening as his text, Mr. Jury expounded on "ergophobia" or hatred of work. In the article, Mr. Upson had stated that an engineer who turns to writing is usually a true ergophobe as contrasted with the pseudo-ergophobe or sidewalk superintendent. "As a writer myself," said Mr. Jury, "I feel a deep spiritual kinship with Mr. Upson."

Mr. Upson, author of the *Saturday Evening Post* Earthworm Tractor stories explained that his career as a fiction writer had begun with the composition of reports

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Local War Emergency Meeting

About SAE Members . . .

After five years of service on war production, **LT.-GEN. WILLIAM S. KNUDSEN** retired on June 1 as the department's director of production. In announcing the retirement, the War Department stated that Mr. Knudsen had received the Oak Leaf Cluster to add to a previous Distinguished Service Medal received for his work with the Air Forces. Known as the "Army's production trouble-shooter," Mr. Knudsen contributed greatly to the nation's war effort by expediting production of critical weapons needed by our troops. He resigned as president of General Motors Corp. to undertake his Government assignment at the special request of the late President of the United States.

Previously manager of the aviation section, Westinghouse Electric Corp., Pittsburgh, Pa., **R. W. GEMMELL** is now temporarily located in the Pacific Coast area on a special assignment and may be reached at the Los Angeles branch of the same company where he is serving as manager of the aviation engineering section.

CAPT. BRUCE G. LEIGHTON, USNR, who had been production executive, Office of Bureau of Aeronautics, Western District, Los Angeles, Calif., has been detached from this office and may now be reached at the Office of the Chief of Naval Operations, the Pentagon Building, Washington, D. C.

At a Board meeting held May 1, **ALBERT L. BERGSTROM** was elected vice-president of engineering, Timken Roller Bearing Co., Canton, Ohio. Mr. Bergstrom was formerly executive engineer of the company.

Formerly at the Amphibious Training Base, Camp Bradford, Norfolk, Va., **MICHAEL J. KOZAK,** USNR, has been transferred and may now be contacted c/o Fleet Post Office, New York City.

ENSIGN FRED J. HART, formerly stationed at the Diesel Engineering School, North Carolina State College, Raleigh, N. C., has been transferred and may now be contacted c/o Fleet Post Office, New York City.

Formerly acting chief engineer, Turbo Engineering Corp., Trenton, N. J., **JOHN G. WILLIAMS** has recently become associated with the Cochrane Corp., Philadelphia, Pa., as mechanical development engineer.

Previously personnel director, Weatherhead Co., Cleveland, **DAVID GILCHRIST, JR.,** is now industrial relations director, General Industries Co., Elyria, Ohio.

HAROLD S. HANSEN, an ensign in the U. S. Naval Reserve, is now stationed at the Naval Air Technical Training Center at Memphis, Tenn. In civilian life, he was experimental test engineer, Allison Division, General Motors Corp., Indianapolis, Ind.

J. L. ATWOOD, executive vice-president, North American Aviation, Inc., and **HALL L. HIBBARD,** vice-president and chief engineer, Lockhead Aircraft Corp., represented their respective companies at the dedication ceremonies of the Southern California Cooperative Wind Tunnel at Pasadena, Calif., on May 13. The project, financed and owned by four Southern California aircraft companies, Consolidated Vultee Aircraft Corp.; Douglas Aircraft Co., Inc.; Lockheed Aircraft Corp.; and North American Aviation, Inc., is to be operated by the California Institute of Technology.

DR. ROBERT E. WILSON, chairman of the board, and chief executive officer of Standard Oil Co. of Ind., has recently been appointed a director of Chase National Bank, New York City. Dr. Wilson is a former SAE Councilor.

Formerly vice-president in charge of sales, Airplane Mfg. & Supply Corp., Glendale, Calif., **K. R. JAMESON** has organized his own firm, Jameson & Co., Hollywood, Calif.

JACK R. DOIDGE is now assistant to district manager, Philgas Industrial Division, Phillips Petroleum Co., Bartlesville, Okla. He was formerly project engineer, Chrysler Corp., Highland Park, Mich.

Previously field engineer with Fen-Mar Co., Inc., New York City, **HOMER W. HARD** is now engaged in technical service writing with the Wilkening Mfg. Co., Philadelphia, Pa.

D. J. DESCHAMPS, well known in the field of fuel injection as president of Deschamps Fuel Injection Corp., Rutherford, N. J., has been engaged by American Bosch Corp., Springfield, Mass., as consulting engineer on gasoline injection. Mr. Deschamps, very active previously in aircraft diesel engine development, has been associated since 1935 with the design and development of gasoline injection equipment for aviation engines. Mr. Deschamps is a former member of the SAE Diesel-Engine Activity Committee.

After an overseas assignment for Sterling Engine Co., **ARTHUR BAITZ** has returned and is now test engineer for the same company, Buffalo, N. Y.

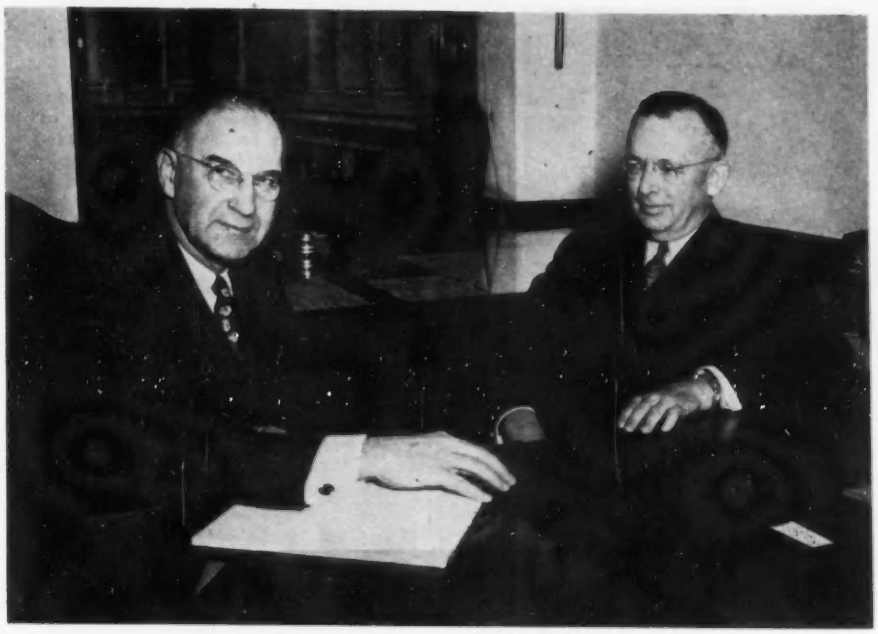
Ralph S. Damon

A. N. Kemp

American Airlines Promotions

Ralph S. Damon (left), formerly vice-president and general manager of American Airlines, Inc., has been elected president of the organization. Mr. Damon served as president of Republic Aviation Corp. from 1941 to 1943, during which time he was instrumental in the production development of the P-47 Thunderbolt fighter. A. N. Kemp (right), the wartime president of American Airlines, will remain active in the company's affairs as a member of the board of directors

Crawford Moves Up



SAE President James M. Crawford has become assistant to General Motors' Vice-President C. L. McCuen (right). Mr. Crawford moves up to his new post following more than 16 years as chief engineer of GMC's Chevrolet Division – during which time Chevrolet became the nation's largest selling car – and made major engineering contributions to fighting equipment for World War II. In his new activities, Mr. Crawford will be concerned with a wide range of technical development and coordination problems

Wood Advanced

John G. Wood (left), for more than 12 years assistant chief engineer, has been made chief engineer of the Chevrolet Division. Like Mr. Crawford, Mr. Wood is a Hoosier, having acquired his elementary education in Indianapolis and started his engineering career there with the National Motor Vehicle Co. He was associated with the Delco-Remy, Oldsmobile, and Muncie Products Divisions of GMC before joining the Chevrolet organization. Edward H. Kelley (inset), becomes Chevrolet's assistant chief engineer. He had been chief engineer of Chevrolet's aviation division in Buffalo since 1941. He came to Chevrolet originally from Studebaker in 1928 – as a designer – and in 1940 was placed in charge of all Chevrolet project engineering

M. J. ZUCROW, executive engineer, Aerojet Engineering Corp., Azusa, Calif., discussed "Jet Propulsion Principles and Rockets for Assisted Take-Off" at a meeting of the American Society of Mechanical Engineers, June 11. The talk was illustrated by films.

Formerly owner of his own firm, **JOHN J. NARGI** is now engineer in charge of engine development, Menasco Mfg. Co., Burbank, Calif.

CHARLES C. CUPP, who had been sales engineer, Firestone Tire & Rubber Co., Philadelphia, Pa., is now a manufacturers' representative with Firestone Steel Products Co., Detroit.

NELSON B. NELSON has been appointed factory representative in the Detroit area for National Motor Bearing Co., Inc. He was formerly division manager in the Chicago branch of the same company.

Formerly at the Regional Hospital, Camp J. T. Robinson, Ark., **ROY T. ADOLPHSON,** a captain in the U. S. Army, has been transferred to headquarters, Fort Sill, Okla.

FRANK W. GODSEY, JR., has recently been appointed manager of the New Products Division of Westinghouse Electric Corp., East Pittsburgh, Pa. Since joining the Westinghouse organization in 1940, Mr. Godsey has served in the division he now directs.

CARROLL N. RILL, who had been chief chemist with the Nox-Rust Corp., Chicago, is now development chemist, Valvoline Oil Co., Franklin, Pa.

After four years of continuous sea duty in the Pacific area, **LT.-COM. PAUL H. VERD,** USNR, has returned and may now be reached at the U. S. Naval Engineering Experiment Station, Annapolis, Md. Commander Verd's new tasks will involve diesel engineering. While in the Pacific area, he was squadron engineer, Submarine Squadron 22, and was engaged in submarine maintenance work.

Previously fuels and lubricants engineer with Standard Oil Co. of N. J., New York City, **EDWARD O. PETZOLD** is now affiliated with Intava, Inc., same city.

ROBERT J. WOODS has recently been named technical adviser to the president of Bell Aircraft Corp., Buffalo, N. Y., in addition to his duties as chief design engineer. He had formerly been chief design engineer and director of the same company. Mr. Woods is a former member of the SAE Aircraft Activity Committee.

BERT W. WETHERBEE has recently been appointed to the technical sales organization of the General Latex & Chemical Corp., where he will be responsible for the area including western New York, Ohio, Michigan, Pennsylvania, New Jersey, and Maryland. He was formerly manager of the technical service department, American Res-

Canadian Appointments

R. S. McLaughlin

W. A. Wecker

R. S. McLaughlin has been appointed chairman of the board of General Motors of Canada, Ltd., Oshawa, Ont., Canada, after serving as president continuously for 26 years. Mr. McLaughlin's appointment to the post of chairman rounds out Canada's longest and most distinguished automobile career. Having joined the Society in 1909, Mr. McLaughlin is SAE Canadian Section's oldest member. William A. Wecker, formerly vice-president and general manager of General Motors of Canada, Ltd., succeeds Mr. McLaughlin as president and general manager of the company. Mr. Wecker is a past-chairman of SAE Canadian Section

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inous Chemicals Corp., Peabody, Mass. Widely known throughout the rubber industry for many years, Mr. Wetherbee has been active in many professional groups. Mr. Wetherbee will continue to have his headquarters in Buffalo.

C. H. BAXLEY, Intava, Inc., New York City, has had directorial duties added to those he already sustains as vice-president and technical manager of the company. Active in SAE Metropolitan Section affairs, Mr. Baxley is a former treasurer and vice-chairman of the Section.

R. W. McLAUGHLIN, who was formerly division engineer, Blower & Supercharger Division, Elliott Co., Jeannette, Pa., is now affiliated with the Carrier Corp., Syracuse, N. Y., as assistant director of development and is in charge of centrifugal compressor and heavy machinery in the engineering section.

ROBERT W. KINNEY, Air Technical Service Command, Engineering Division, Powerplant Laboratory, Wright Field, Dayton, Ohio, who was formerly associate mechanical engineer, aircraft engines, has received a position change and is now project engineer working on Allison aircraft engines.

R. WAYNE GOODALE, after thirteen years as supervising engineer in charge of field research and development of fuels and lubricants for the Calif. Research Corp., is now serving as assistant manager of the newly created product acceptance department of Standard Oil Co. of Calif. in San Francisco. Mr. Goodale's duties will involve primarily the coordination of the activities of the marketing and manufacturing department and of the Calif. Research Corp. in the maintenance of an acceptable line of petroleum products. Mr. Goodale was vice-chairman of Northern California Section in 1944.

R. L. FENN, JR., has been promoted from the rank of sergeant to second lieutenant and may be addressed at 180th Infantry Battalion, A.P.O. 45, c/o Postmaster, New York.

W. S. REED, who had been diesel engineer with Western Engine Co., Division of Vernon Tool Co., Alhambra, Calif., is now affiliated with Industrial Engineers, Associated, same city, as consulting engineer working on diesel engines.

A. J. JEUDE has recently been appointed assistant to the chief engineer, design, Busch-Sulzer Bros. Diesel Engine Co., St. Louis, Mo. He was formerly a design engineer for the same company.

Formerly at Camp Hood, Tex., **DANIEL BROWN,** a private in the U. S. Army, has been transferred and is now stationed at Fort Belvoir, Va.

WALTER L. DRAY, formerly liaison engineer, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., has recently received a position change and is now assistant chief engineer of the aircraft armament engineering department of the same company.

Formerly consulting engineer, **F. R. WITTNEBERT** is now president of the newly organized company, Wittnebert-Jones Corp., Chicago. The company specializes in development engineering.

KENNETH W. ELVIN has recently been appointed sales engineer of Sun Oil Co., Newark, N. J. He had previously been manager, Macmillan Petroleum Corp., Los Angeles, Calif.

Previously with the Y-Force Motor Transport Brigade, A.P.O. 488, c/o Postmaster, New York, **COL. L. A. BURBANK,** U. S. Army, may now be contacted at U S. Forces, China Theater, A.P.O. 627, c/o Postmaster, New York.

JOHN H. GEISSE, in addition to his duties as consultant, Civil Aeronautics Administration, has recently been appointed special assistant in personal flying development to **T. P. WRIGHT,** CAA administrator.

Formerly consulting engineer, Ferodo & Asbestos, Inc., New Brunswick, N. J., **WILLIAM OVERMAN** is now in the industrial friction materials division of Thermoid Co., Trenton, N. J.

LT. WILBURT MARCUS, USNR, who was formerly test and trials officer, Supervisor of Shipbuilding, Wilmington, Del., has been transferred and may now be contacted c/o the Commandant, Puget Sound Navy Yard, Seattle, Wash.

LORIN L. FERRALL is now director of metallurgy, Crucible Steel Co. of America, New York City. He had formerly been metallurgical engineer, Rotary Electric Steel Co., Detroit.

Previously assistant director, aircraft development section, Fisher Body Division, General Motors Corp., Detroit, **WILLIAM O. WATSON** has been transferred to the Allison Division of the company in Indiana where he is assistant director in the installation engineering section.

Formerly sales manager, Climax Engineering Co., Clinton, Iowa, **JOHN A. MAHONEY** is now sales engineer for Hercules Motors Corp., Canton, Ohio.

COL. J. H. SMITH, a member of the British Army Staff, who had been technical adviser on trucks, British Ministry of Supply Mission, Washington, D. C., will soon return to England to take up his appointment as commanding officer, Wheeled Vehicle Experimental Establishment, British War Office, Farnsborough, Hampshire, England.

Formerly a student member at the University of Manitoba, Winnipeg, Manitoba, Canada, **VIVIAN R. GOFF** is now employed by the Stratos Corp., Farmingdale, L. I., N. Y., a subsidiary of Fairchild Engine & Airplane Corp.

M. A. WHITEHEAD is no longer sales promotion engineer, American Smelting & Refining Co., research department, Barber, N. J. He is now affiliated with Revere Copper & Brass, Inc., Baltimore, Md.

HOWARD F. KIRK, JR., a lieutenant (jg) in the USNR, who had been at the Naval Air Station, Alameda, Calif., may now be reached at the Naval Air Station at Patuxent River, Md.

Formerly a student member at Purdue University, Ind., **ROBERT J. BECKER** is now employed by Cummins Engine Co., Inc., Columbus, Ind., as junior engineer.

Previously owner of the Warner Lewis Co., Tulsa, Okla., **WARNER LEWIS** is now vice-president of sales and engineering, Flotrol Systems, Inc., New York City.

Formerly assistant inspector, British Air Commission, Paterson, N. J., **F. W. MOORE** has been transferred to the British Air Commission staff at Packard Motor Car Co., Detroit.

DONALD W. WING, a private in the U. S. Army, has entered the Field Artillery Officer Candidate School at Fort Sill, Okla.

Before entering the service, Candidate Wing was employed by the International Harvester Co., Inc., Chicago.

Formerly at the Air Technical Service Command, Wright Field, Dayton, Ohio, MAJOR ALAN H. BLAIR, U. S. Army, may now be reached at the San Bernardino Army Air Field, Calif.

H. YALE MAGEOCH, formerly chief engineer, Lear, Inc., Piqua, Ohio, has returned to his former company, Electric Service Mfg. Co., Philadelphia, Pa., where he is serving in the same capacity.

Formerly in the automotive division, Ordnance Research & Development Center, Aberdeen Proving Ground, Md., LT. ALBERT V. ZIMMERMAN, U. S. Army, has been transferred and may now be reached at the Maintenance Division, Office of the Chief of Ordnance, Detroit.

JACK C. D. MANES, who had been service manager, GMC Truck & Coach Division, General Motors Corp., Los Angeles, is now connected with the Union Oil Co. of Calif., Eureka, Calif.

LAWRENCE B. WHIT was recently named director of organization and public relations, Rhode Island Public Expenditure Council, Providence, R. I. Mr. Whit was formerly technical information specialist, Division of Patent Administration, Office of Alien Property Custodian, New York City.

ALBERT F. POLK, vice-president in charge of engineering, Sheffield Corp., Dayton, Ohio, has been selected by the War Department for a mission in the occupied territory on the Western Front. His appointment carries with it the rating of a lieutenant colonel, although he is classified as a civilian. He left Dayton on March 27. Mr. Polk was chosen for this assignment because of his broad knowledge of engineering and manufacturing processes. He is a graduate of the University of Wisconsin and has been head of the Engineering Division of the Sheffield organization for several years.

BYROM J. SMITH, JR., formerly production executive, Lycoming Division, Aviation Corp., Williamsport, Pa., has been appointed chief production engineer of Pitney-Bowes Postage Meter Co., Stamford, Conn. A native of Indianapolis, Mr. Smith has held important engineering positions with Fairbanks, Morse & Co.; Allison Division, General Motors Corp., and other midwestern manufacturing concerns.

Byrom J. Smith, Jr.

Formerly vice-president and general manager of Ryan Aeronautical Co., San Diego, Calif., O. L. WOODSON is now general manager of his own firm, O. L. Woodson Co., Los Angeles, which specializes in industrial development and management service.

H. G. STEIGERWALT, a lieutenant in the USNR, formerly a representative of the Bureau of Aeronautics, c/o Brewster Aeronautical Corp., Johnsville, Pa., is now serving the Navy in the same capacity at the Crown Can Co., Philadelphia, Pa.

C. NEWMAN DAWE is now market statistician for Vanadium Corp., New York City. He was formerly manager of the Automotive Division of the Detroit branch of the same company.

D. L. WERTZ, who was Detroit representative for the Eclipse Machine Division, Bendix Aviation Corp., over a period of 10 years, has been appointed special representative for the A. G. Redmond Co. of Owosso, Mich. Mr. Wertz will have his headquarters

D. L. Wertz

in Detroit. Plans have also been made to expand the engineering service of the company to the customers, and in this connection, PAUL BEST, working in conjunction with Mr. Wertz, has been assigned the responsibility of assisting with customer's technical problems.

Formerly a student member of the SAE, EDWARD KOCZAT, a seaman second class in the USNR, has been transferred from the Naval Air Technical Training Command, Norman, Okla., to the assembly and repair shop, Naval Air Station, Norfolk, Va.

SAE members in the armed forces who have received recent promotions include: C. L. CHRISTENSEN, SHAEF Mission (France), APO 887, c/o Postmaster, New York City, and J. M. HENDERSON, JR., 226th Ordnance Base Depot, APO 70, c/o Postmaster, San Francisco, have been promoted from lieutenant colonel to colonel; JOHN S. TAWRESEY, U. S. Army Air Forces, Wright Field, Dayton, and W. B. HEMPHILL, Liaison Headquarters (Greece), APO 512, c/o Postmaster, New York City, from major to lieutenant colonel; and R. G. MESCHINO, RCAF, Rockcliffe, Ontario, Canada, from flying officer to flight lieutenant.

In the Navy, ARTHUR C. JENKINS, USNR, San Francisco, Calif., has been raised from lieutenant commander to commander.

George Spatta

GEORGE SPATTA has been elected president of Clark Equipment Co., Buchanan, Mich., where he had formerly been vice-president and general manager. Mr. Spatta is widely known in automotive circles for his distinguished achievements in the field of production engineering. Many of the products manufactured by Clark were developed by him. Joining the Clark organization in 1927, Mr. Spatta served successively as development engineer, chief engineer, general manager, and vice-president. Mr. Spatta was a member of the Production Engineering Activity Committee in 1944.

SAE members who have received recent changes in company status include: A. W. PUTNAM, from product tool engineer, Propeller Division, Curtiss-Wright Corp., to research engineer, L.G.S. Spring Clutch Corp., a subsidiary of Curtiss-Wright Corp.; HARRY C. WANNER, Midwestern Magnesium Co., Garrett, Ind., from manager to general manager; ROBERT D. BEATTY, JR., Eaton Mfg. Co., Cleveland, Ohio, from chief engineer in the Heater Division to research engineer; JOHN R. FOLEY, who had been aeronautic engineer with United Aircraft Corp., is now assistant project engineer with Pratt & Whitney Aircraft Division, same company; HARRY J. SYMON, Aviation Division, Studebaker Corp., South Bend, Ind., from test block foreman to test cell supervisor; formerly chief engineer, Moraine Products Division, General Motors Corp., Dayton, Ohio, J. A. LIGNIAN is now bearing engineer of the same division.

Also, RUDOLPH F. RIESZ, Ryan Aeronautical Co., San Diego, Calif., from engineering representative to manager of the salvage section; J. H. MARSDEN, Consolidated Vultee Aircraft Corp., San Diego, Calif., from process engineer to engineering designer B; CHARLES H. KLOER, Packard Electric Division, General Motors Corp., Warren, Ohio, from sales engineer to eastern division manager; H. GERSHINOWITZ, Shell Oil Co., Inc., from research director of the New York branch to director of exploration and production research in the Houston, Tex., branch of the same company.

DONALD R. LOCKWOOD, a warrant officer in the U. S. Army, may be reached at

Camp Swift, Tex. He was formerly stationed at Camp Gruber, Okla.

RICHARD H. DeMOTT, vice-president in charge of sales, SKF Industries, Inc., Philadelphia, Pa., is observing his 30th anniversary at SKF. After working for Westinghouse Lamp Division, Westinghouse Electric

Richard H. DeMott

Corp.; Johns-Manville Sales Corp., and others, Mr. DeMott joined the SKF organization in 1915 and has remained there since that time. He received his engineering degree at Stevens Institute of Technology.

Chicago and Metropolitan Sections ran a dead-heat on Sunday, May 27, in the coast-to-coast broadcast program "The Battle of the Cities" which originated in stations WGN and WOR. Identical questions were asked of paired contestants, and both of the four-man teams recorded 135 points. The pairs, representing Chicago and Metropolitan Sections respectively, were: **RAY D. KELLY,** United Air Lines, Inc., and **MERRILL C. HORINE,** Mack Mfg. Corp.; **HARRY L. MOIR,** Pure Oil Co., and **R. F. GAGG,** Wright Aeronautical Corp.; **WILFRED W. DAVIES,** United Air Lines, Inc., and **CLIFFORD M. LARSON,** Sinclair Refining Co.; **NORMAN C. PENFOLD,** Armour Research Foundation, and **CHARLES F. FOELL,** *Diesel Power & Transportation.*

STERLING K. KEYSER, formerly a student member at Purdue University, West Lafayette, Ind., is now dynamometer operator in the Engine Test Laboratory, Perfect Circle Co., Hagerstown, Ind.

Recently returned from internment at Santo Tomas in the Philippines, **H. G. LYMAN** is still in the employ of the Pennzoil Co., Los Angeles, Calif. Before his internment, Mr. Lyman was special representative in the Far East for the same company in Manila, P. I.

The gold medal of the American Institute of Chemists was presented to **JOHN W. THOMAS,** chairman of the Firestone Tire & Rubber Co., Akron, Ohio, by **DR. GUSTAV EGLOFF,** president of the Institute. Mr. Thomas was honored for his leadership in rubber research for nearly 40 years, and for achievements made under his direction in the development and production of synthetic rubber.

Formerly specification process engineer, Wright Aeronautical Corp., Paterson, N. J., **JOSEF K. HOENIG** is now process engineer in the Aircraft Division, Packard Motor Car Co., Toledo, Ohio.

Formerly a captain, **JOHN S. LIEB** now holds the rank of major and may be reached c/o Ordnance Department, Ordnance Research & Development Center, Aberdeen Proving Ground, Maryland.

CHARLES B. EISENHAUER has been elected vice-president and a director of F. L. Jacobs Co., Dearborn, Mich., where he will be assistant to the vice-president in charge of the company's eight plants. Mr. Eisenhauer was formerly general manager of Jacobs' Lonyo plant.

Formerly at the Dover Army Air Base, Dover, Del., **LT. ROBERT L. STEPHENS** is now with the 368th Fighter Group, A. P. O. 141, c/o Postmaster, New York City.

SAE Members who have received recent promotions within the White Motor Co. include **ROBERT E. BUSEY,** from development engineer to executive White Horse engineer; **THOMAS S. KEMBLE,** from project engineer to development engineer; **RUDOLPH LISCH,** from chief draftsman of the General Engineering Department to senior chief draftsman of the same department; **C. A. MILLER,** formerly assistant chassis engineer, is now axle design engineer; and **VIRGIL C. SPEECE,** from truck production engineer to executive truck engineer.

Formerly general manager, Flatbush Chevrolet Sales Corp., Brooklyn, N. Y., **CLAUDE M. WAGNER** is now the owner of Ideal Garage, Mongaup Valley, N. Y.

ALBERT L. KAYE, formerly manager of the Alloy Bureau, Metallurgical Division, Chicago district of the Carnegie-Illinois Steel Corp., has been promoted to metallurgical engineer, alloy products department, with offices in the Pittsburgh division of the same company.

Formerly consulting engineer, **H. L. WITTEK** is now affiliated with the Bardco Mfg. Co., Los Angeles, Calif.

FRANK M. HAWLEY has been appointed vice-president and general manager and has also been elected to the board of directors of Morse Chain Co., Ithaca, N. Y., and Detroit. Mr. Hawley, formerly manager of the Detroit plant, succeeds **C. J. KENERSON,** who retires as active head and continues as a director and vice-president. The Ithaca plant

Frank M. Hawley

of the company soon will be expanded anticipating increased post-war demand for the company's products.

J. L. ANDERSON, who had been lubrication technician, Southwest Grease & Oil Co., Wichita, Kan., is now serving as lubrication engineer for Maritime Oil Co., with headquarters in Dallas, Tex.

Formerly at the Naval Training Station, Cornell University, Ithaca, N. Y., **JAMES M. BEAUCHAMP, JR.,** a lieutenant (jg) in the USNR, has been transferred and may now be contacted c/o Fleet Post Office, New York City.

FRED BELL, JR., is now assistant to the president of Vulcan Mfg. Co., Inc., Winona, Minn. He was formerly manager of the Chicago branch office of Felker Mfg. Co., Torrance, Calif.

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OBITUARIES

Clyde W. Stringer

Clyde W. Stringer, senior checker, Cadillac Motor Car Division, General Motors Corp., Detroit, died March 25 at the age of 62. After his graduation from Michigan Agricultural College in 1905 with a B.S. degree, Mr. Stringer came to the Cadillac Motor Car Co. After working for a number of other companies, Mr. Stringer returned to the Cadillac organization where he was employed until his death. He had been a member of the Society since 1910.

Raymond F. Cook

Raymond F. Cook, tool and die designer, Hoffman Specialty Co., Indianapolis, Ind., died April 17 of pneumonia. After serving in the U. S. Navy in World War I as a machinist, Mr. Cook joined Fairbanks, Morse & Co. doing general tool and dieroom work. Some time later, in 1931, he came to Studebaker Corp., South Bend, Ind., where he specialized in general tool and experimental work in the engineering department. Mr. Cook became a member of the Society in 1941.

John J. Lombard

John J. Lombard, senior engineer, Chambers Corp., Shelbyville, Ind., died recently at the age of 57. Mr. Lombard had for many years been active in the engineering field. Among his contributions to automotive engineering are special motor and assembly line tools, jigs, fixtures, and dies. A member of the Society since 1936, Mr. Lombard was active in the affairs of SAE Indiana Section.

O. O. Rieser

O. O. Rieser died May 10 at the age of 51. After receiving his B.S. degree from Carnegie Institute of Technology in 1916, Mr. Rieser started his chemical and technological career in the research department of the Pittsburgh Testing Laboratory, Philadelphia. Continuing his chemical engineering work, Mr. Rieser came to the American Cyanamid Co., New York City, in 1918. In 1923 he became resident manager in charge of battery case manufacture at the Richardson Co., Melrose Park, Ill. Mr. Rieser was elected to member grade in the Society in 1926.

Cleveland

cont. from p. 22

Experience with Diesel Fuels and Lubricants." Com. Galindo explained "the performance of diesel fuels and lubricants in the fleet under combat conditions is naturally of as great interest to the petroleum and engine industry as to the Navy.

"The usual procedure of informing industry of its performance is to forward a long series of complaints after there is very definite evidence for the need of an improved product. However, the satisfactory performance of these products is usually not too well advertised. Many field difficulties are never reported until the accumulation of casualties becomes very high, and then the avalanche descends." He stated that the purpose of his paper was "to present in a quantitative way some measure of the performance of diesel fuels and lubricants."

One of the features of the Fuels & Lubricants Session was a paper, "Slow Motion Study of Injection and Combustion of Fuel in a Diesel Engine," presented by Cearcy D. Miller of the Combustion Photography Section, NACA Engine Research Laboratory, Cleveland Airport. The author related the early history of this type of photography, explained the apparatus and procedure and then showed movies which had been made of combustion in a diesel engine cylinder by a special camera which he developed.

The movies shown consisted of motion pictures taken at the rate of 40,000 frames per sec., showing the injection and combustion of fuel in a diesel engine, as observed through glass windows mounted in the cylinder head. The movie compared the result obtained with single orifice versus multiple orifice fuel injection nozzles; demonstrated the relations between injection advance angle, injection lag, fuel vaporizing, smoke formation and diesel knock as characterized by quick inflammation of the fuel charge, and also demonstrated the product of mixtures too lean for combustion with very early injection and small fuel quantities.

Fred C. Crawford, president of Thompson Products, Inc. and Thompson Aircraft Products, as toastmaster, introduced Dr. Kettering. Mr. Crawford, during his introduction, also commented that it was the engineer's job to teach the world the way to better living, and as the "last of the realists," to lead the way. Dr. Kettering stated that the reason Germany was defeated was because "Hitler overlooked the fact that America knew more about tool making than any other country."

"Boss" Kettering's "down to earth" ways of thought and expression were emphasized in his talk by the lambasting he gave some engineers for their use of highly technical language, which he claimed "couldn't be understood by anyone." "Speak English," Dr. Kettering urged, "the world doesn't understand technical language. Technology is the science of finding out about things that have been here for a long time," he told his audience.

Suggests Radio Review

THE Radio Manufacturers Association has called to the attention of the SAE Electrical Equipment Division the question of providing the 1500-1600 kc range in sets for post-war cars and trucks.

With the increased number of stations using these frequencies, the communication pointed out, receiving set manufacturers should give more attention to adequate selectivity in this range.

Soon after the 1500-1600 kc range had been added to standard broadcasting, it was recalled, manufacturers except those making sets for the automobile industry extended the scales on their sets to include the new band. At that time selectivity was not good in ranges of higher frequencies.

R. M. Critchfield, chairman of the SAE Electrical Equipment Division of the Standards Committee is forwarding to his Subdivision members and others the suggestion of the RMA that this question be examined before plans for post-war automobile radios have been frozen by vehicle manufacturers.

St. Louis

cont. from p. 23

and expense accounts during his employment as a tractor mechanic in the early twenties. Patterning his talk after a technical paper, Upson pointed out that tractor engineers were required to do three things in order to become successful:

(a) fix the tractor,
(b) fix the owner, and
(c) fix the boss.

"Basically the only difference between an author and an engineer," he said, "is that the engineer's creations must work, while an author's creations need only sound like they might work. And, like the engineer, the author can always fall back on research as a means of killing time when he is stuck."

Though the formal meeting was closed at the end of the evening session, local and visiting members were entertained the following day at the Busch-Sulzer plant in St. Louis. Some 60 members and guests were conducted through the plant by Ralph D. Jackson, research engineer for the firm, and were then entertained at a buffet luncheon.

Student Branch News

At the June 5 meeting of the University of Wisconsin SAE Student Branch officers were elected to serve for the summer term. George E. Hlavka was voted Branch Chairman; James K. Bakken, Vice-Chairman; and Robert W. Fleming, Secretary.

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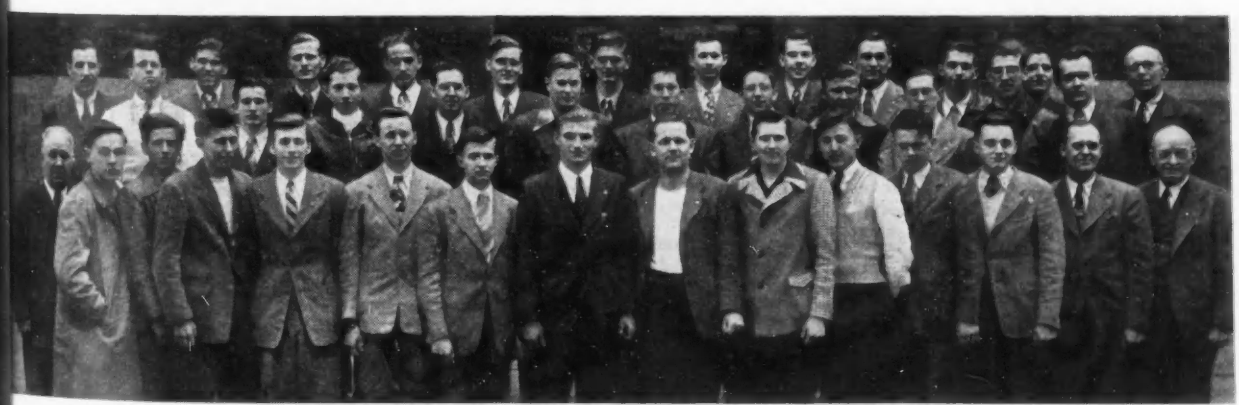
The Detroit Institute of Technology SAE Club concluded an active season with its May 2 election of officers for the 1945-46 school year. Walter Mueller was elected chairman; Fred Dietrich, vice-chairman; John Bruno, treasurer, and Donald Lytle, secretary.

Meetings of the SAE Club have been held every second Wednesday throughout the school year. Programs have included field trips to various local industrial plants and the showing of industrial motion pictures.



Left to right, back row: Prof. J. Loerch, Alex Nagy, Albert Koski, Ted Borys, Harry Holm, Michael Loncar, Walter Meuller, William Maddock, Steve Szczerbacki, Fred Dietrich, John Losinsky, Prof., L. L. Henry. Center row: John Locklin, Louis Waskowiz, Arthur Habbel, George Martin, Frank Torode, José Gonzalez, John Bruno, Henry Monik, Joe Varga, Richard Hofmann, Bill Michaluk.

Front row: Louis McKnight, Director; Jack Hindes, Jack Knapman, Jack Bachman, Robert Perko, John Dietrich, Donald Lowe, Secretary; Stanley Surowiak, Pres.; John Karpuik, Treasurer, Vincent Labute, Albert Chittaro, Donald Lytle, Edward Maikrzak, Frank Biscak, Dean, C. C. Winn.

AIR

SAVING
Ground Time

by HARRY S. PACK
Pennsylvania-Central Airlines

▪ 1944 National Air Cargo Meeting

(Excerpts from paper entitled "Saving Ground Time in Air Cargo Handling")

PRACTICALLY all parts of the ground operation of current airline operation affect ground time and are subject to much development. Recognizing that present aircraft, primarily the DC-3, was not designed for handling the volume now being carried, plus the difficulty of securing more adequate planes, the present program resolves itself into a process of refinement and improvement of both aircraft and ground facilities – a matter of alleviating rather than eliminating operation difficulties.

Since improvements in planes could not be fully utilized unless the "bucket brigade" system of loading through the DC-3 nose door – an opening 22 x 38 in. about 10 ft above the ground – could be improved, we developed a mechanized loader to do this job. The need was for a flexible, movable unit that could load or unload a volume of material with a minimum of personnel, and the cargoveyor is a development of this thinking.

One of the biggest problems is the amount of handling required to move an item from one airport terminal to another. Computations show that each piece is handled 16 to 20 times or more. This indicates the need for consolidation of loads and some form of preloading – and containers of at least two or three unit sizes may be one answer.

To permit rapid and efficient sorting and interchange of material, a good-sized centrally located area, that is, a cargo room, is necessary. Here loads can be assembled geographically by trips – carts, pallets, containers, and so forth, should be used.

Another important reason for reducing ground time is the problem of designing airport stations or terminals with a sufficient number of loading positions to handle peak hour loads, both from a space and cost standpoint. It is also essential that we materially reduce the paper work involved in handling air cargo.

There is also room for aircraft improvements in order to permit the passenger or a porter to carry all but the largest bags into the cabin of a plane. Some suggestions are:

1. The bulkhead separating passenger-cargo sections should be movable to permit a variable size cargo compartment. Seats in the cabin should be removable in the range of the bulkhead movement and collapsible so that they can be stored in the plane when maximum cargo space is being used.

2. An accessible baggage compartment should be provided in the cabin to eliminate the necessity for commuter and short-haul passengers checking baggage at the ticket counter.

3. The number of cargo compartments should be kept to a minimum, with each compartment an unobstructed area with provision for installing adjustable separators which would be adjusted to each bin size required for the various routes.

4. Double doors should be provided in main cargo compartments with a total width of 54 in. and a height of 72 in. in order to permit simultaneous loading and unloading of cargo.

5. Passenger and cargo doors should be located on the left side of the fuselage so that no traffic will develop on the field side of a parked airplane.

6. Install adequate artificial lighting facilities in the cargo compartment and provide daylight through the use of sky lights.

7. Consideration should be given to providing air conditioning and heating equipment in the plane so that ground equipment and time will not be required for this purpose.

8. Some thought should be given to the subject of temperature control – the degree of control depends upon the type of cargo to be carried. However, the cargo compartment should be designed to maintain a minimum of 40 F at all times. Good ventilation in the cargo compartment is equally necessary.

All indications point toward carrying some cargo on practically all airline planes in the future. The value of small cargo loads in building up the load factor, plus the advantages in time saving that frequency of service makes possible, cannot be overlooked. Such improvements as larger doors and more accessible compartments will help considerably.

Transport Experience

by C. P. GRADDICK
United Air Lines

▪ 1944 National Air Cargo Meeting

(Excerpts from paper entitled "Transport Operation Experience with Cargo Airplanes")

THE Cargoliner is United Air Lines' commercial service.

Interior arrangement of the Cargoliner (shown in Fig. 1) was planned with a view of the greatest convenience in loading and unloading and security through proper distribution of weight and good tiedown arrangements. On one side there are installed five partial bulkhead separators of expanded metal construction, which are variously spaced on floor beams making bins from

cargo

about 54 to 80 in. wide with a capacity each of from 59 to 121 cu ft. These enable even distribution of the load and help prevent shifting of loads in flight.

The open aisle on one side provides easy access to all bins and makes possible quick loading and unloading. The standard front bulkhead has been retained intact. A portion of the rear bulkhead has been necessarily retained for protection of the lavatory.

With the pit bulkhead separator arrangement and through the use of web nets very little additional tiedown has been necessary. Web nets are installed in such a way that bins may be closed individually. Webbing used in the construction of the net used for securing cargo is about 1½ in. wide, and has a breaking stress of 856 lb.

One problem which developed in using this net was that of devising a fast method of securing the nets to the tiedown rings, of which there are five aisle rings to each large pit. However, engineers provided a strap and snap assembly affixed to the net instead of to the rings and so designed it that the load strain can be removed from tiedown rings without removing the strap from the net, thus making it impossible to lose or misplace the harness snap.

Another problem which arose was the frayed ends of the web straps which slowed down the tieing process. It was necessary to resort to the use of a less satisfactory metal tip. Ropes are now seldom used except to tie down long pieces in the aisles.

It was decided from the beginning that passengers were not to be carried. However, provisions for an observer, and in extreme emergency, two, were made.

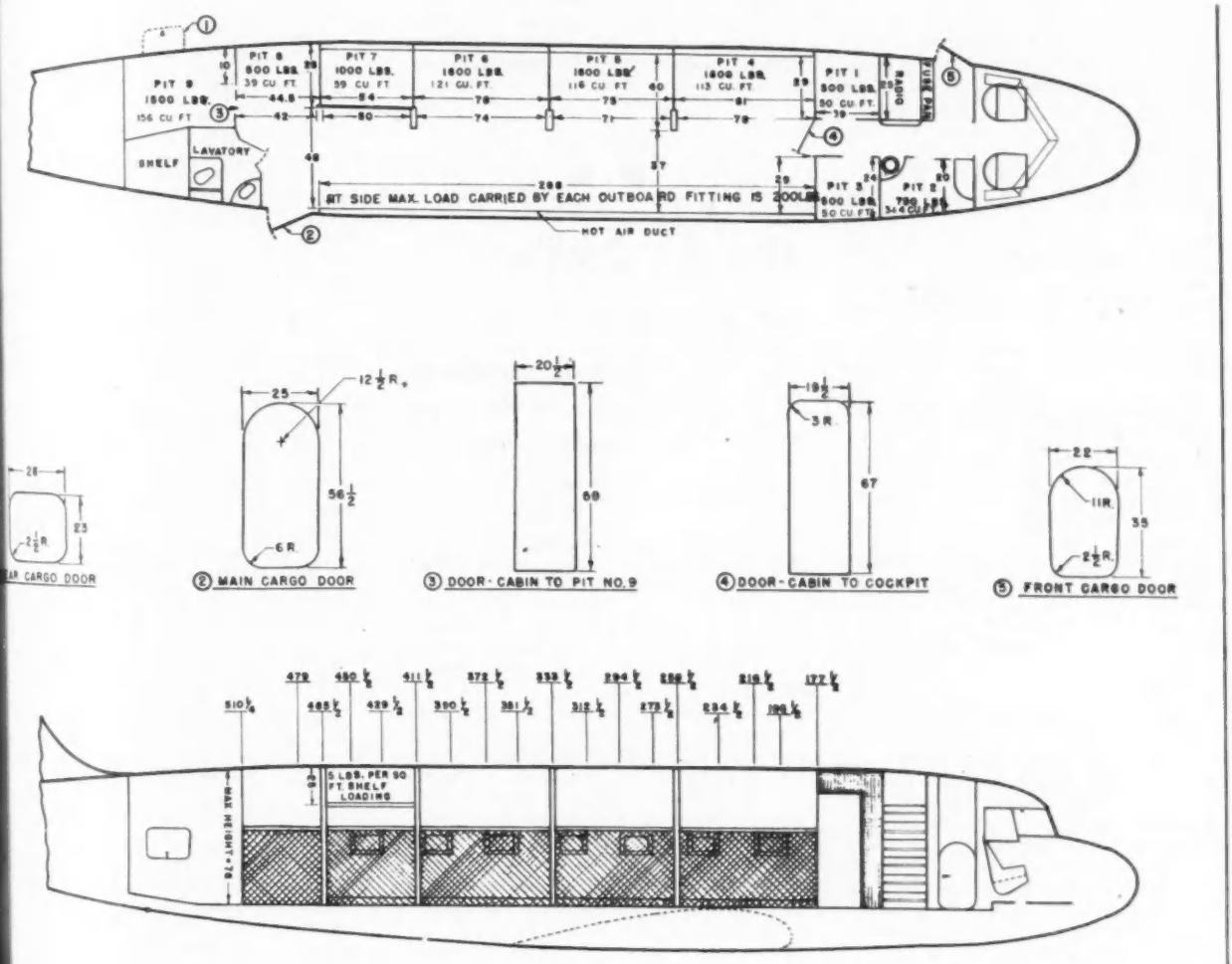
Station Handling of Cargo

There is a distinct advantage in the loading and unloading of cargo. At many of the stations, the Cargoliner can be parked near the hangar, clear of other ramp traffic, and a truck can be backed to the main cabin door, through which there is easy access.

Plywood floors on these commercial planes have proved satisfactory, as they are not as slippery as corrugated metal floors.

One of the bad features of the present Cargoliner is the door opening. Inasmuch as these are converted planes of the passenger type openings are too small for convenient loading and unloading. With large doors, more varied types of loading and unloading equipment also could be used.

Another disadvantage is the sloping floor inherent in the DC-3 type plane. It is highly desirable that a cargo plane be parallel with the ground, since the advantage of moving cargo on a level surface is apparent.



■ Fig. 1 – Cargoliner interior

Recording Scale Helps Determine Oil Consumption

by KARL H. EFFMANN
Perfect Circle Co.

▪ **Indiana, March 8**

(Excerpts from paper entitled "Engine Oil Consumption Determination")

THE system used for determining oil consumption on automotive and truck engines in our company involves using the engine lubricating system as it was designed. A normal oil level in the engine oil pan is maintained by the scavenge and return oil pumps – the former pump having twice the capacity of the latter. Since we are interested in obtaining blowby readings on all engines that we test, a special recording oil scale was developed for this purpose.

Engine oil sump temperatures are maintained by means of a circulating pump, heat exchanger, and three-way valve. Oil is drawn from one end of the engine oil pan by the circulating pump and is pumped either through the heat exchanger or bypassed according to the position of the three-way valve. A constant amount of cooling water is usually allowed to flow through the heat exchanger and oil temperature is regulated entirely by the position of the three-way valve. Very close regulation of the oil temperature and engine speed are required to obtain satisfactory results using this system – and with good control, accurate oil consumption rate determinations can be made within an hour after starting a test.

Another set-up in use in our engine laboratory for determining oil consumption on aircraft engines, involves operating a co-operative universal engine with a dry sump. Oil flows from the engine crankcase by gravity into a vertical pipe outside the engine, as well as from the circulating pump through the heat exchanger. Oil temperature is thermostatically controlled by the position of the three-way valve. A pressure relief valve is fitted in the discharge line from the three-way valve, maintaining a constant pressure at the pressure pump inlet. This pump forces oil through the oil filter to the engine bearings. The circulating pump has a greater capacity than the total engine oil flow and the excess oil is returned by the first pressure relief valve to the circulating pump inlet. A second pressure relief valve is fitted to the pressure pump so that a constant pressure can be maintained at the engine bearings.

An oil level is maintained in the vertical pipe outside of the engine sump by means of the scavenge oil pump. The scavenge and return oil pumps are respectively 1 gpm and ½ gpm, approximately the same as used on the method to determine oil consumption on automotive engines. An advantage of this system is that the oil pumped through the heat exchanger and oil filter is free of entrapped air. A definite quantity of oil is, therefore, always contained in the circulating system which eliminates this source of oil tank weight variation. Oil flow to the engine is checked by means of the pressure drop across a thin plate orifice in the line to the engine bearings, which has proved a reliable method.

Changes in oil consumption rate in this system and the one previously described are readily observed on the recording oil scale, and many times piston-ring troubles are indicated on the oil scale before any change of blowby can be noticed.

This system is more complicated than the one usually used by aircraft-engine makers inasmuch as four external pumps are required. We consider external pumps an advantage in our installation since all the oil in and out of the engine can be warmed to operating temperature before the engine is started. During the warmup period and whenever there is insufficient heat developed in the engine to maintain a normal engine oil temperature, steam is circulated through the heat exchanger instead of cooling water. This allows us to maintain constant oil temperatures regardless of engine speed or load.

When we decided it would be advantageous to have a strip chart recording scale to weigh the oil tank, we supposed a suitable instrument could be purchased. It was finally necessary to construct one, and although the one we made did not have enough sensitivity as originally designed, we overcame that shortcoming by using string.

Not only is this recording scale a good means of determining oil consumption rates. It has many other uses, and can be constructed to handle most any weight. Weight changes of less than 0.01 lb can be detected, provided contacts at the end of the beam are in good condition and set closely. Contact spacing is usually 0.003 in. or less, so very little vertical movement of the oil tank results.

■ ■

Aluminum Qualifies for Post-War Uses

by P. B. JACKSON
Aluminum Co. of America

▪ **Philadelphia, March 14**

(Excerpts from paper entitled "Aluminum After the War")

THE available supply of aluminum and its price are both important factors influencing its usefulness in post-war markets. However, aluminum and its alloys have many characteristics – intrinsic and basic – which individually or collectively produce better products than other available materials.

The transportation industry as well as the marine field have become increasingly conscious of the fundamental economics of weight saving. Combining these industries with the probable expanded commercial air transport trade, the aluminum industry can anticipate a growing market along these lines.

High conductivity and nonmagnetic characteristics recommend aluminum for many electrical applications. The high thermal conductivity of pure aluminum has also been an important influence in its selection for pistons, cylinder heads, heat exchangers, and cooking utensils.

Aluminum and most of its alloys are highly resistant to atmospheric corrosion. They also have the widest range of fabricated forms of any of the common materials. They can be cast in sand, they can be rolled into foil, or they can be hammer-forged.

The development of a casting alloy which will be made from scrap has been completed. This alloy, which responds to heat-treatment and can be cast in sand, will find broad usage in the post-war period if the price differential at that time between primary alloys and alloys made from scrap is greater than it is today.

Development of aluminum bearings is typical of another type of research activity in the industry. Thousands of hours of testing in both gasoline and diesel engines have proved that an aluminum bearing alloy can carry high unit loads at high rubbing velocities. It can be cast in permanent molds and has exceptionally good machining characteristics.

Engineering Development

The systematic accumulation of sound design practices has been the responsibility of the development group. They had to coordinate their specific knowledge of aluminum's physical characteristics with the operating requirements of an entire piece of equipment. Their recommendations do not neglect such considerations as the differential in thermal expansion between aluminum and steel, or that the modulus of elasticity of aluminum is 10,000,000 and not 15,000,000 or 30,000,000. Fastening practices, where studs and bolts can be stressed to near their elastic limit, are based on stress laboratory data that has been checked in field practice. Design recommendations are based on stress determinations derived from stresscoat and strain gage studies and fatigue data from similar parts or developed by tests of the particular design under consideration.

A thorough knowledge of the various fabricating characteristics of aluminum is given full consideration, thereby insuring a practical and commercially sound design.

There is an almost invisible ingredient in these design recommendations. It is taken from a list of things "not to do" with aluminum. The research and development groups have continuously reduced the factor of ignorance that exists in all products.

The designer has in aluminum a versatile material. Because of its foundry characteristics, castings can be designed so that one piece substitutes for several pieces that would require machining, fastening, and assembly. Savings in these cost items often combine with lighter and more efficient constructions. Facilities available for producing large and intricate forgings in high-strength alloys can be equally attractive when designing equipment to reduce machining costs, assembly time, and overall weight. Aluminum extrusions can be developed so that a single piece, without welds, rivets, or other assembly methods, will replace built-up sections made up of several pieces welded or riveted together. This type of designing can be effectively used where die or permanent mold castings are required.

The future of the aluminum industry looks bright. The vast amount of metal available and the many new uses developed for the war effort will be directly applied to peacetime industries. Finally, the emphasis placed on research and development will continue to produce usable and useful materials and fabricating arts well suited to the many demands of industry.

turn to p. 33

. . . MAINTENANCE Necessary to Life of Synthetic Truck Tires

by R. A. BLAKE
U. S. Rubber Co.

▪ **Pittsburgh, May 9**

(Excerpts from paper entitled "Field Performance – Synthetic Truck Tires")

A RECENT company survey across the country on the performance of synthetic truck tires in both small and large truck sizes shows that they are performing up to our expectations.

Overall performance from synthetic truck tires ranges from a minimum of 40% to a maximum of 90%, with an average of about 70%. Those truck operators who have established and followed through a sound maintenance program with definite controls on such factors as loads per tire, speeds, tire inflations, proper matching of duals, correct rim size, and so forth, are the ones who have achieved maximum performance figures.

Experience of the field shows that recapping of synthetic truck tires has not been as successful as it was with rubber – particularly on highway operations. Recapping of tires is economically sound, however, when performed properly, which means it should be done in a shop which subscribes to the best known quality standards in materials and workmanship.

There has also been wide variation in performance on sectionally repaired synthetic truck tires. Field experience in general has been poor on this item, again mostly on highway operations. Sectional repairs must be done in a quality shop if results are to be satisfactory.

Protection Zones Set Up for Aircraft Electrical Systems

▪ **Southern Ohio, April 24**

(Summary of paper on "Protection of Electrical Systems on Military Aircraft" by Capt. R. J. Lusk, Air Technical Service Command)

COMPLETE protection of aircraft electrical systems on military aircraft is assuming greater importance as these aircraft are designed with more essential functions dependent upon the electrical system. A more reliable electrical system to supply power for these functions can be obtained by conformance to better application principles and revised electrical system design.

Aircraft electrical systems may be divided into the following protection zones:

1. Generator circuits, which extend from the generator to the generator control relay or disconnect switch.

2. Distribution network, which is the positive wiring between the generator control relay and the points at which the individual load feeder circuits connect to the distribution network.

3. Individual load circuits, which connect individual loads or items of equipment to the distribution network.

Adequate protection of generator circuits can be accomplished by polarized circuit breakers.

Dependability of the distribution network can be improved by redesigning the system layout, but complete fault protection in this zone is difficult. Until additional weight for protection is justified, complete protection against all faults will not be installed. In the future, this zone will probably consist of multiple channels sectionalized through bus tie circuit breakers tripping on unbalanced current. Junction boxes in which buses are located will be protected through ground current detection methods. This equipment must be adapted for aircraft use and thoroughly tested.

Individual load feeder circuits form the largest zone of the electrical system and greatly improved protection can be obtained by the use of proper application methods and by the use of satisfactory circuit breakers. Individual load feeder circuit protection should accomplish:

1. Prevention of cable damage due to overheating.

2. Freedom from nuisance operation.

3. Whenever possible, prevention of overloading of the generating units due to a fault current on an individual load feeder circuit.

The relative time-current characteristics of cable damage, machine current and correct circuit breaker are illustrated in Fig. 1.

Adoption of the following requirements would assure protection for this zone:

1. All individual load feeder circuits should be connected to the distribution system through a circuit breaker at the junction of the load circuit with the distribution network.

2. The interrupting capacity of the protective device should be greater than the maximum available fault current at the circuit breaker location.

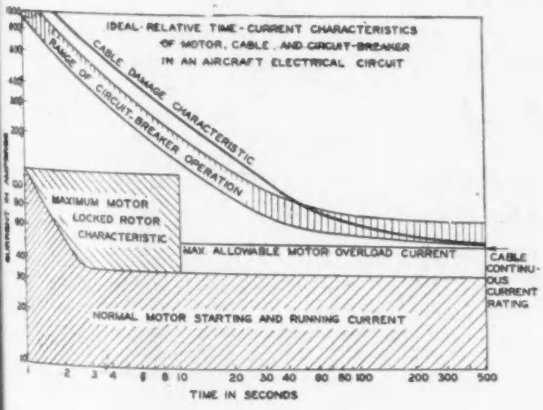
3. The time-current characteristic of the circuit breaker must be lower than the time-current characteristic of the cable in the protected circuit.

4. The time-current characteristic of the circuit breaker must lie above the maximum time-current characteristic so as to assure freedom from nuisance operation.

5. When possible, the circuit breaker should trip on fault currents of sufficient magnitude to cause overloading of the generating system.

6. The circuit breaker should be chosen to obtain protection for the electrical equipment in a circuit only if protection for the equipment does not interfere with the preceding rules. Adequate consideration must be given to the advantage of sensing equipment temperature.

If these rules are to be followed, additional types of circuit breakers must be developed and aircraft manufacturers must have more information concerning methods of determining aircraft electrical system characteristics. A program is now in progress to develop aircraft circuit breakers with adequate current ratings and interrupting capacity. Time-current characteristics will give the necessary information for choice of circuit breaker for most individual feeder circuits under ambient temperature variation.


IDEAL RELATIVE TIME-CURRENT CHARACTERISTICS OF MOTOR, CABLE, AND CIRCUIT-BREAKER IN AN AIRCRAFT ELECTRICAL CIRCUIT
RANGE OF CIRCUIT-BREAKER OPERATION
CABLE DAMAGE CHARACTERISTIC
MAXIMUM MOTOR LOCKED ROTOR CHARACTERISTIC
MAX. ALLOWABLE MOTOR OVERLOAD CURRENT
CABLE CONTINUOUS CURRENT RATING
NORMAL MOTOR STARTING AND RUNNING CURRENT
TIME IN SECONDS

▪ **Fig. 1 – Ideal relative time-current characteristics in an aircraft electrical circuit**

Surplus Transport Market Calls for Proper Control

by C. J. McCARTHY
United Aircraft Corp.

▪ **Kansas City, Nov. 16**

(Excerpts from paper entitled "Aircraft Manufacturing and Air Transport")

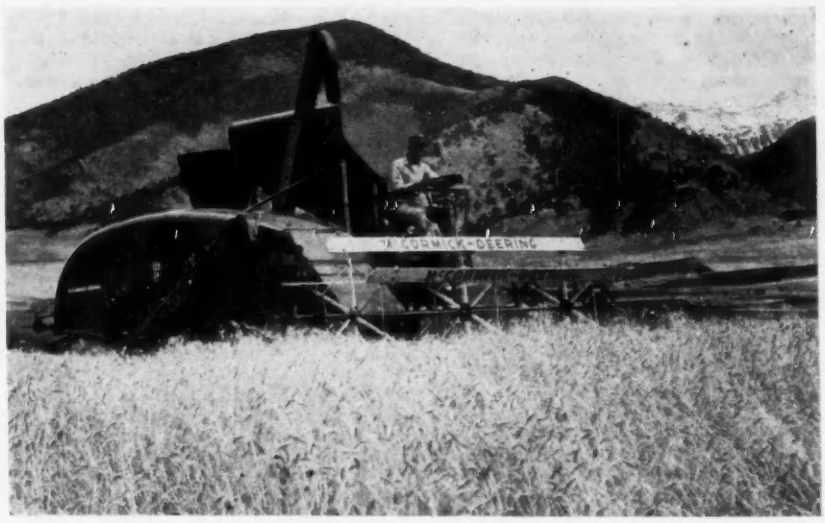
THERE is ample evidence that air transport has come of age.

Numerous American and foreign airlines are seeking to fly international airways. Shipping lines and railroads here and abroad wish to include airlines in their operations. There are 100 applications pending before the Civil Aeronautics Board. Orders have been placed by one company for advanced types of transports having cruising speeds of 240 to 300 mph. With the advent of jet propulsion, gas turbines, and other unconventional powerplants, it is safe to forecast that the future will bring transport airplanes which can cruise at speeds of about 400 mph. The industry is now bursting with new ideas, and is preparing post-war transports superior to anything we have previously enjoyed.

Just how large the airplane manufacturing industry will be after the war is difficult to estimate. One thing is certain; the industry will shrink back to a much lower level than at present. This will result in contract terminations and disposal of surplus products and plants.

The Contract Settlement Act of 1944 should lead to prompt and equitable settlement of contract claims. However, disposal of surplus planes is a problem which may mean either a source of future strength or damage to the industry.

These are problems for management and the Government to work out, giving full consideration to the future best interests of the country.



International Harvester's new Model 123-SP, one-man, one-engine, 12 ft, self-propelled combine

Developments Rapid in

ONE-MAN FARM MACHINES

by LEE H. FORD
International Harvester Co.

▪ ***Wichita, Feb. 1***

(Excerpts from paper entitled "Recent Developments in One-Man Operated Farm Machines")

AMONG the latest developments in farm equipment are:

Field Ensilage Harvester – This enables the farmer to put his corn into the silo when it is in the most ideal stage of maturity. This harvester is operated by the man on the tractor, and since the wagon is attached to the harvester while being loaded, the manpower requirement is reduced to a minimum.

Field Hay Chopper – Used in dry hay this will pick up, chop, and load hay out of the windrow. Its capacity in dry hay is about 4 to 8 tons per hr with a medium tractor. To store the hay it is blown into the barn. For this operation the ensilage cutter or forage blower may be used.

Automatic Pickup Baler – One man with the automatic baler can bale as much hay or straw as three or four men with a pickup baler requiring a man to feed, two to put in wires, and another to drive the tractor. Also, baling with the automatic type can be done when the hay is in the best condition, thereby getting better quality hay because the owner does not have to trade work with his neighbors – and in most communities, he cannot hire help. The baler is powered by a 4-cyl, 14-hp engine so it can be pulled by a small tractor, and it differs from conventional balers in that the bales are bound with a heavy twine instead of the well-known baling wire.

This baler makes it possible for one man to process a hay crop successfully.

Self-Propelled Harvester Thresher – All pedal and lever controls for operating the self-propelled combine are within easy reach of the operator. The platform is raised and lowered by a hydraulic lift; separate clutches engage the engine with the driving wheels and the separator so that either can be operated independently of the other; and an electric starter cranks the engine when a button on the instrument panel is pressed. The machine can be quickly changed for harvesting different crops. Screw adjustments on the outside of the machine raise or lower the cylinder and increase or decrease the size of the openings in the concave.

■ ■

. . . . *RELATION*
of Plane Performance to Temperature Urged

by T. N. FLOYD
Douglas Aircraft Co., Inc.

▪ ***1944 National West Coast Aeronautic Meeting***

(Excerpts from paper entitled "Aircraft Environment, Thermal Effects")

AIRCRAFT which is not narrowly restricted in latitude and altitude of operation must withstand the effects of (1) ambient temperatures which extend from —100 F to 200 F, and (2) temperature changes which under adverse conditions will become very rapid, of the order of 40 F per 1000 ft.

Temperatures are low and relatively stable at high altitudes and are moderate and stable at ground level in the tropics. The widest variation occurs, however, at ground level in temperate and polar regions; and aircraft which must operate in Arctic regions, such as those adjacent to the Bering Sea, must cope with temperature inversions of considerable severity.

Extremes of compartment temperature are even more widely separated than extremes of ambient temperatures because of the effects of solar radiation and of aerodynamic or kinetic heating – so that allowances must be made in fully enclosed areas for temperatures as high as 200 F.

The effects of changes in steady-state temperature upon stresses exerting on fixed structural members and upon fittings employing such structural features as force fits are of great magnitude.

For example, assume we have a member 24 in. long, rigidly fixed at both ends which has the geometry of a truncated cone with a diameter of 1 in. at one end and 3 in. at the other. For this material, $E = 30\times10^6$ and the thermal coefficient of expansion is 6.5×10^{-6}. The member is to be exposed to a 50 F temperature reduction, and maximum stresses are required. The contracting e in the member due to the coefficient of expansion requires a force P to produce an elongation to equal e.

$$e = 50\times6.5\times10^{-6}\times24 = 0.0078 \text{ in.}$$

d will equal the diameter and A the area at any section of the cone x inches from the small end. Then $d = 1+\frac{1}{12}x$.

$$A = \frac{\pi}{4}\left(1+\frac{1}{12}x\right)^2$$

$$e = \int_0^{24} \frac{P}{E\cdot\frac{\pi}{4}\left(1+\frac{1}{12}x\right)^2}\,dx$$

$$= 0.00000034P = 0.0078$$

$$P = 22{,}900 \text{ lb}$$

The maximum stress will be at the small end of the cone, therefore

$$S = \frac{22900}{0.785} = 29{,}200 \text{ psi}$$

(This is valid only within the proportional limit of the material.)

Transient conditions may present a very serious phase of the temperature problem when temperatures are changed abruptly. Attempts to analyze transient conditions by direct application of heat transfer phenomena become very involved and complex – although in some cases solutions can be obtained by the use of a dimensional analysis. In any event, the transient temperature problem is one to which the designer is invited to give careful attention. If a reasonably simple, theoretical, or empirical analysis of this condition can be derived, it will save much time and cost in laboratory test work.

. . . AIRCRAFT Lighting Apparatus Standardized by AAF

by MAJOR A. D DIRCKSEN
Air Technical Service Command

▪ 1945 War Engineering-Annual Meeting

(Excerpts from paper entitled "Aircraft Lighting")

SINCE aircraft lighting is necessary to maintain the airplane in flight during night operation and to permit satisfactory operation from and to land on airports and runways at night, a program has been initiated to standardize on internal and external lighting installations between the Army Air Forces and the Bureau of Aeronautics.

Various units of exterior aircraft lighting equipment are described as follows:

1. Position lights, wing tip and tail. Present standard wing tip lights are of the single-unit type and are mounted on the extremities of the wing tips. The standard AN type tail lights are designed to mount on the trailing edge of the rudder or tail cones depending on the airplane design. These units replace the two-lamp type tail lights in order to reduce the aerodynamic drag which was necessary on new high-speed type of aircraft. The wing tip and tail lights are separately controlled and dimmed to permit formation flying.

A red passing light, installed in the leading edge of the left wing, is used to supplement wing tip lights to provide additional safety for airplanes flying along airways and for airplanes in congested areas.

2. Landing lights. These lights are of the fixed and retractable types. The fixed type is normally mounted in the leading edge of the airfoil or on some fighter-type airplanes the lights may be mounted on the wheel strut. Electrical retractable lights are mounted flush in the underside surface of the wings. Lights are directed and installed as shown in Fig. 1.

3. Taxi lights. On night-fighter-type airplanes, the taxi light, which is used to supplement landing lights, is an all-glass reflector lamp, 28 v, 50 cp, with 30-deg horizontal spread lens.

4. Recognition lights. Flush-type recognition lights are designed to use the high-speed multifilament signaling lamp mounted in a flush mixture. These lights, one each red, green, and amber, are mounted in the undersurface of the fuselage or the right wing tip.

5. Flush formation lights. This light is designed to use the standard 3-cp, 28-v, T-3-1/4 lamp and is supplied with a fluted lens to project the light beam to the rear and to the airplanes following in formation. This lamp assembly is connected to a control switch and dimming resistor for use in clear dark nights.

6. Bomb release light. This light, usually located in the tail cone of the airplane, is used as a signal to the airplanes in formation when to open the bomb-bay doors. This is indicated by a white light.

Various interior aircraft lighting equipment are explained as follows:

1. Instrument lighting. Fluorescent ultraviolet floodlighting system is used by the AAF and consists of a 4 w, 28 v, d-c, blue fluorescent RP-12 lamp in a lamp housing with an ultraviolet light filter.

2. Auxiliary instrument lighting system is accomplished by a red spotlight, AAF Type C-4A. This light is designed to give a flood or spotlight beam, and has a self-contained lamp dimming rheostat with an off-position switch.

3. All crew members are required to carry on their person an AAF Type A-6A pentype flashlight, designed with a selective red light filter on the lamp head.

4. Indicator lights, performing an important function in aircraft, are used to indicate for both day and night operations the positions and condition of various items of equipment on the airplane.

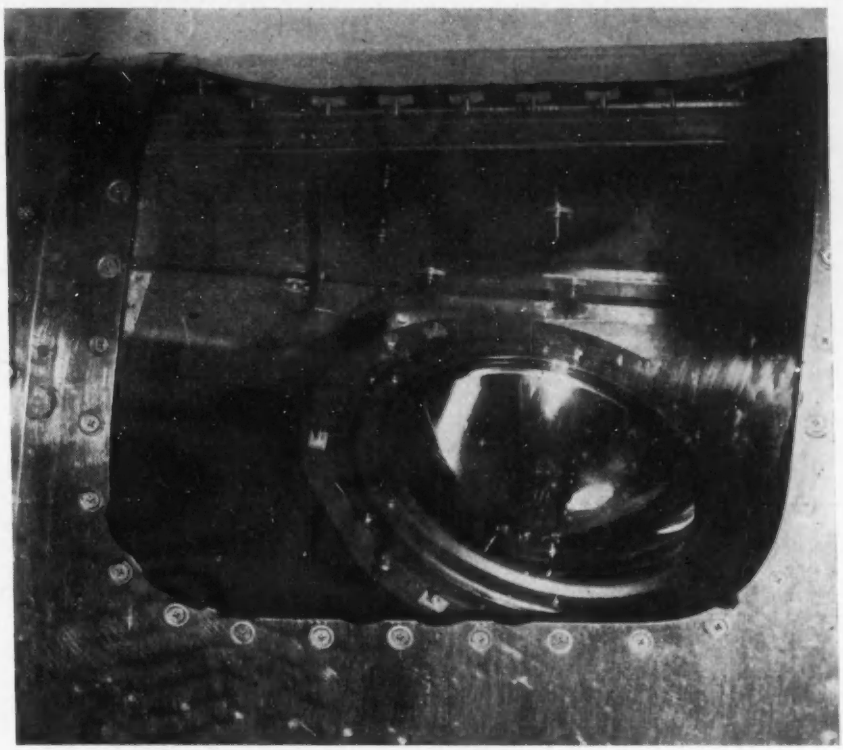
5. Cockpit extension lights. An extension cockpit light has been standardized that produces selective white or red light and is supplied with a 6-ft extension cord that retracts on a spring-loaded reel when not in use, and has the lamp head held to the reel housing.

6. Interaircraft control light. This light, shown in Fig. 2, is used on tactical type of aircraft for signaling between airplanes in formation, and between airplane and ground to permit suitable identification, and for transmitting messages by light flashes.

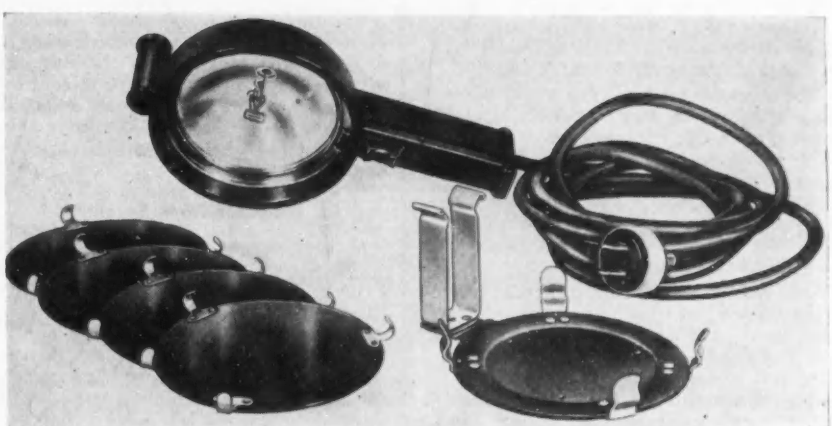
7. Worktable lights. The navigator's and radio operator's worktables are illuminated by flexible arm cabin worktable lights.

8. Cabin lights. This light, which has a frosted cover glass added to protect the lamp and to diffuse the light better, uses a silver-tipped, 21-cp, 28-v lamp.

9. Cabin vapor dome light. This is used in bomb-bays.

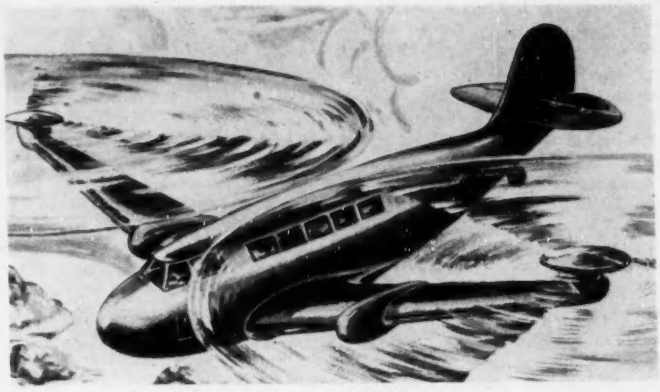


▪ Fig. 1 – B-17 wing landing light



▪ Fig. 2 – Interaircraft signal lamp

HELICOPTER



by
W. Laurence LePage
Platt-LePage Aircraft Co.

▪ Kansas City, Nov. 17

(Excerpts from paper entitled "The Helicopter")

FLYING a helicopter is not complicated, but I do not believe this plane is yet ready for the man in the street. For commercial operation, however, it is no harder for a professional pilot to fly a helicopter than it is to fly his fixed-wing airplane.

The helicopter is a two-place observation-type machine – all glass in front so the pilot can see in every direction. He has no engine or propeller in front of him, but he does have two propellers or rotors out on either side and a little back of him which are automatic in operation. The pitch is also automatic. The control stick, rudder pedals, and throttle control are of standard type.

The pilot presses an electric starter and the engine that is in back totally enclosed in the fuselage, cooled by a pressure fan, starts to turn over and at that same time the rotor blades start to turn. In a few seconds the engine fires and starts up. Having warmed up, the pilot holds the control stick central. He may, if the wind is blowing fairly hard, jockey himself around into the wind, but if there is not a high wind it is not very important whether he is headed into the wind or not. As the pilot opens the throttle wider the ship will appear to get light, and it will pull out on the struts. If the pilot moves the control stick a little he will start to slide sideways or backwards and can control that motion. The machine will have a fully castered undercarriage, and if the pilot doesn't like his position, he can taxi over a few hundred feet.

The helicopter needs more power to hover than it does to fly forward, except at full throttle, when flying at maximum speed and using all the power available. If, therefore, I am hovering and have the throttle about two-thirds open, and I push the stick forward and start to travel, I will climb rapidly, and must throttle back if I don't wish to gain altitude.

One problem of helicopters at this time is the durability of rotor blades. Rotor blades have been made with a steel tubular spar and a plywood covering. There are about three tons of centrifugal pull on the blades of the helicopter at all times during flight. There is no major bending, because the blades, being hinged, just float. But with all that, a little dust will ruin a set of rotor blades in a very short time. The dust is blown up by the helicopter rotor and abrasion of the leading edge of the blade starts in at once. All-metal rotor blades, I believe, will be the answer to this very serious drawback. Metal rotor blades will also be the solution to the icing problem.

Maintenance costs in helicopter operation, as compared with a similar airplane, conservatively might run as much as 10 or even 15% higher than those with the similar fixed-wing airplanes.

In performance, the helicopter can be expected, for some time, to be at least 20% slower than the equivalent airplane. In fact, the helicopter will never be flown at more than 300 mph, when the tip speed velocities on the input side of the rotor disc would approach the speed of sound.

However, against this speed handicap I cannot overemphasize the surprises that are in store in the ability of the helicopter to carry a load. The helicopter has an astonishing lifting capacity. A machine with a designed gross weight of 4800 lb, which came out at 5200 lb, including a 1200-lb designed useful load, has lifted 2100 lb off the ground very easily.

Because the load capacity is high, so the rate of climb will be high. Since more power is needed to hover than to fly forward, however, the pilot will be able to climb more rapidly at a forward speed of 50, 60 or 70 mph than he will vertically. The plane will only go up about 25% vertically; after that, the plane goes forward. A helicopter with a service ceiling of 30,000 ft will only be able to climb 10,000 ft vertically.

I am sure that in the not distant future the helicopter will be used by commercial airlines as a supplementary means of transportation for delivering passengers from their homes or stations to the main liners. It is not too early in the technical development of the helicopter to regard it as a practical proposition in small sizes.

History of the "Whatsit" Plane

by WALDO D. WATERMAN
Waterman Research Engineering Co.

▪ Southern California, April 19

(Excerpts from paper entitled "History of the Development of the Modern Tricycle Landing Gear, Tailless Flying Wing and the Roadable Airplane")

IN the summer of 1932 I built my first tailless airplane known as the Waterman "Whatsit." No attempt was made to make this plane – which was a flying wind tunnel model to develop tailless airplane theory – of the roadable type.

After many tests of taxiing the "Whatsit" at speeds of 25, 40, 45, and 48 mph, it finally became possible to fly the little ship over the length of the field. One apparent fault, however, was that the relationship of the thrust line to the vertical center of pressure was very critical in the tailless plane design.

Foolproof Plane Sought

In 1933 Eugene Vidal, then director of the Bureau of Air Commerce, thought that if some manufacturer could produce a so-called "foolproof" airplane in large quantities and market it at a low figure, a new phase of the aircraft industry could be developed. The specifications of this hypothetical airplane were practically identical with the result toward which I had been working. This decided me to continue my work on the "Whatsit", and in 1934, the plane was ready to fly again, with practically no changes in it.

This plane, re-named the Waterman Arrowplane, was entered in a safety airplane competition sponsored by the Bureau of Air Commerce, and was the first plane to be accepted by the Bureau in this connection. Though this plane was not the complete answer to the private-owner airplane production problem, it was the long step toward the perfection of the tailless airplane and the tricycle gear.

Flying Automobile

Soon afterward the Waterman Arrowplane Corp. was formed for the purpose of securing capital to carry on the work of developing and producing the flying automobile. In 1936 work was started on the first Waterman Arrowbile, the name designating our flying automobile. This was completed in 1937, and proved to be a stable flying airplane, impossible to spin, stall, or acrobatically fly in any way, yet possessing all of the maneuverability required for take-offs, landings, and turns up to vertical banks. It had two controls instead of the customary three – the pushing and pulling of the control wheel nosing the plane up and down and the rotation of the wheel both banking and turning it.

Any degree of turn may be made without skidding by merely rotating the wheel. An auxiliary control is provided by which both rudders may be deflected simultaneously, causing them to function as air brakes. This control is also arranged so that one or the other rudders may be deflected separately.

Forward Docking Improves Airline Terminal Traffic

by J. B. Morse
Boeing Aircraft Co.

1944 National Air Cargo Meeting

(Excerpts from paper entitled "The Relation of Cargo Handling to Air Terminal Services")

PERHAPS the most pronounced error in planning of the air terminal thus far has been in the development of the site plan. It should be the principal function of the site to separate the three major types of traffic – cargo, passenger, and spectator – direct them to the terminal and disperse and locate the associated activities according to their importance where their use will interfere least with the main functions of the terminal.

The three major types of traffic can be handled on three floor levels: cargo to cargo floor near the apron level; passengers directly to the passenger floor above the cargo floor; and spectators to observation floor above the passenger floor. This way the site can separate and regulate surface traffic, thereby insuring that the primary functions of the terminal will suffer a minimum of interference from the secondary functions. The traffic would then move to its respective level and each floor should operate more or less individually.

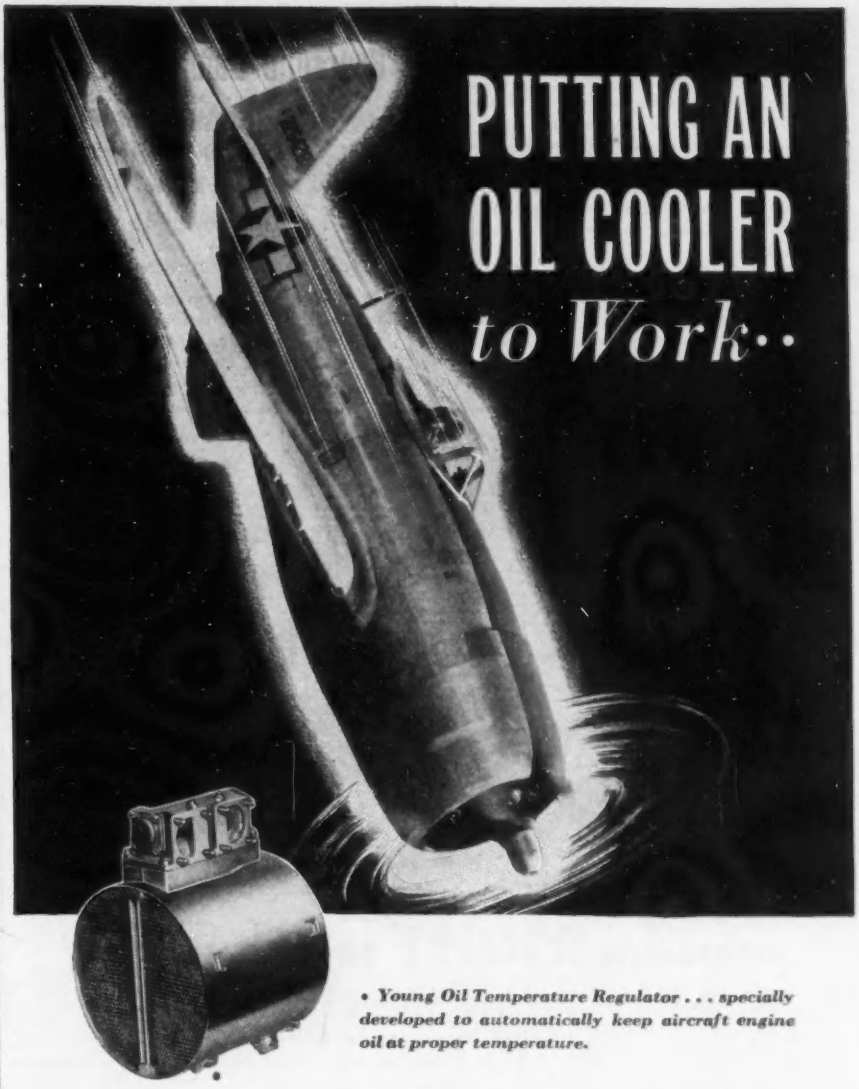
Newer Facilities Needed

Traffic between the terminal and airplane indicates the definite need for improvement of service and facilities. Among the many systems investigated for these improvements, only the technique employing forward docking has been found to permit adequate traffic separation, direct access, protection to cargo and traffic, and direct refueling.

The position of the forward-docked airplane makes possible a direct connection from a forward passenger door in the airplane to the passenger floor of the terminal by means of an adjustable ramp. Distance from the airplane to the terminal is minimum and separate passenger and cargo routes are provided. Stairways are eliminated. Distance from the terminal to passenger door increases with the size of the airplane. Passenger underpasses from the terminal to the plane dock have been suggested as a means to separate cargo and passenger traffic, but the cost of construction makes this impracticable.

The forward-docked airplane can be taxied straight into position with no objectionable slipstream effect. Towing out can be done with a simple hitch to the tail skid, and the airplane can be moved from the dock to the apron before the engines are started, whereupon terminal dock efficiency would be increased.

Where air traffic density necessitates a number of dock spaces for airplanes of various sizes, they can be satisfactorily covered only when the planes are docked forward. A 60 ft. cantilevered roof would cover the outboard nacelles of the large transports now being considered. The passenger route, servicing and refueling as well as most of the



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mail, express and baggage operations would be covered by this size roof.

Overhead refueling, a feature of forward docking, has definite advantages over other refueling methods. Distribution hose can be suspended from the roof and operations are under cover and out of the road of other activities. Overhead access to fuel hoses can be faster without adding to the work of the attendant.

In general, all servicing will be more efficient with forward docking due to accessibility, protection from the weather and distance from the terminal to the airplane.

Hydraulic Damage Attacked by Several Systems

by HOWARD FIELD, JR.
Consulting Engineer

▪ Southern California, April 19

(Excerpts from paper entitled "Reduction of Vulnerability of Aircraft Hydraulic Systems")

IN a hydraulic system there are a number of methods of attack at damage, all of which hold promise of a partial solution to the problem, but none of which is sufficient.

The first method is to reduce the target area of the system. This involves reducing the size of units and tubing, which is being done by more careful design and by using higher working pressures.

Armor plating solely for protection of the hydraulic system is not a desirable attack because of the weight penalty involved. Large lines should be made as short as possible and placed where they are naturally protected by heavy structural members in the airplane or by already existing armor plate. If we consider the proper grouping of lines the vulnerability can be decreased.

Another method of attacking the problem contemplates the use of two lines for each function. The two lines are separated as much as possible and both are used. If either becomes ruptured it is automatically closed off and the other continues to carry fluid.

Still another method is the provision of several independent hydraulic systems, each taking care of a limited number of functions. This method must be combined with a duplication of electrical power and control lines, and the units must be small or vulnerability may show only slight improvement.

A method of attack which has found much favor is the prevention of loss of fluid through a broken line by having the lines relieved of pressure except while actually being used. The selector valves are returned to neutral at all times and the units they control are not being moved. It is unfortunate that this attack cannot by itself do much good, since there is nothing to prevent the pilot from opening a valve to a circuit which has been shot out.

Within the past few months units known as hydraulic fuses have been developed and while they have limitations, they offer the largest forward step in the reduction of vulnerability through the prevention of the spreading of damage.

It is believed that the chance of damage may also be reduced if the designers of all airplane components would cooperate to make the greatest use of all methods a standard procedure in the interests of increased safety.

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. . . . POTENTIALITIES Of Air Cargo Unlimited

by A. W. FRENCH
Transcontinental & Western Air, Inc.

▪ 1944 National Air Cargo Meeting

(Excerpts from paper entitled "Specialties in Air Cargo Shipments")

SPECIALTIES in air cargo transportation are relative depending upon the part of the work under consideration at a given moment.

For example, while heavy machinery is generally not moved by air, possibilities for profit through its use may be sufficiently great to warrant air cartage for all or part of the distance separating manufacturer and user. Such was the case when gold-mining machinery was moved by air to inaccessible areas in the Andes at the time our Government evaluated gold at $35 per oz. Those people interested in the project wished to extract and market the ore as quickly as possible so as to profit from the high price temporarily set on the gold.

The varied classifications of specialties lead us to the matter of rate structure, which is based on cost of operation. There are two types of service involved in rate structures: (1) a package service which includes pickup and delivery; and (2) real freight service catering to shipments of manufacturers' and consumers' goods of substantial weight – which the airlines have not yet inaugurated, but hope to, in the near future.

A market analysis survey has been conducted by industry and by commodity in an effort to draw a pattern upon which to base an air freight service as soon as proper airplanes are available. Once the pattern has been established, it will be necessary to maintain continued analysis by industry, commodity, trading areas, as well as directional flow and season of movement.

It will also be necessary to keep abreast of new manufacturing methods and costs, new distribution methods and costs, and new packaging methods and costs, since these changed procedures will often affect the air cargo potentialities of certain merchandise.

Specialties will come and go depending upon the ingenuity of man, and there will be subdivisions within specialty lines – some will be good potential and others of a very like nature will not be promising because the time element has less value.

Aircraft Service Men Train in New School on Wheels

by HAROLD B. FISHER
Air Transport Command

■ Kansas City, June 7

(Excerpts from paper entitled "Mobile Training Units" given at the symposium on "Indoctrination of Airline Personnel to New Equipment")

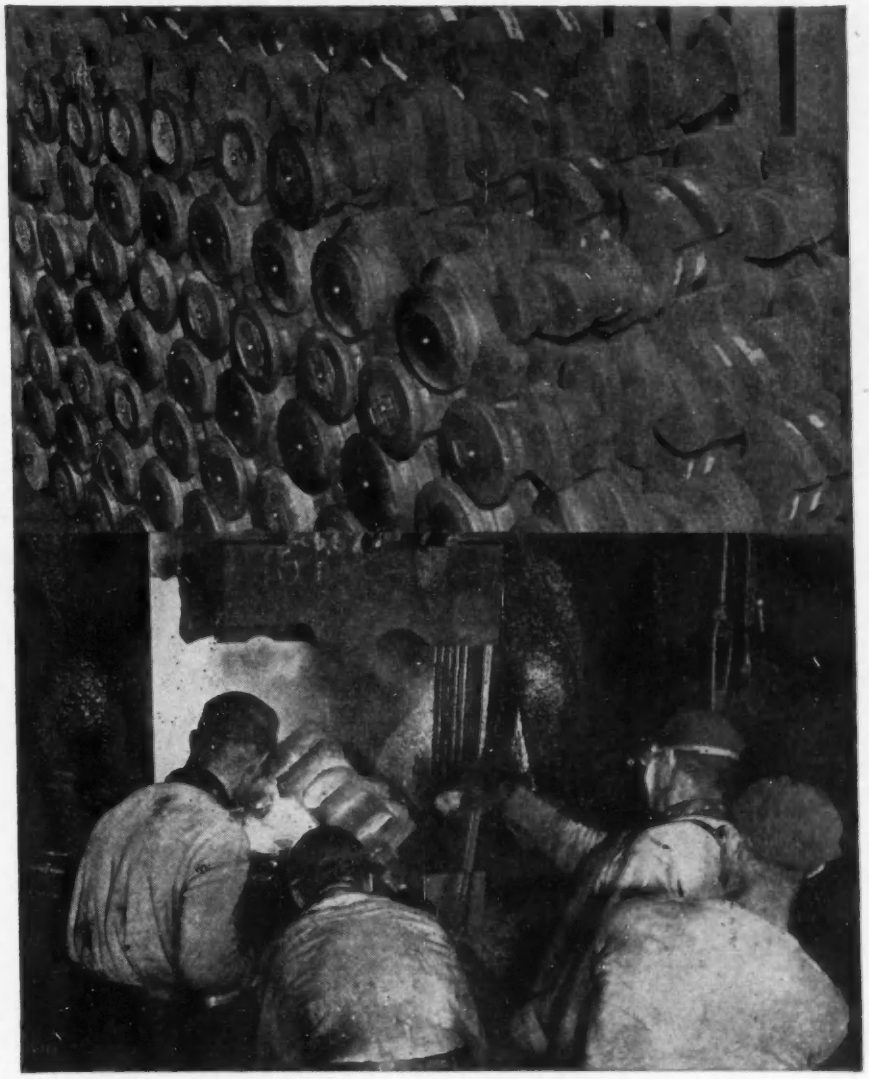
THE mobile training unit is a self-contained and self-sufficient school on wheels which includes operating mock-ups of all functioning systems of the airplane, such as hydraulics, electrical, and instrument systems. The faculty is a crew of from 7 to 11, highly qualified specialist instructors and factory representatives who accompany the equipment.

The functions of this unit are mainly as follows:

1. To demonstrate trouble shooting to crews.
2. To teach most efficient and latest servicing methods to line mechanics, and to stress proper inspection.
3. To show latest modifications and equipment.
4. To bring mock-ups out to the line area for demonstration.
5. To show latest films on aircraft changes.
6. To bring to men in the United States latest tips on procedures used in combat all over the world.
7. To stress emergency operations in flight.
8. To accompany an actual crew on a flying mission.

The usual cut-away engine and a radio demonstration unit are added features in many mobile units. Current needed for operation of the units is provided by an auxiliary power unit which enables instruction to be given adjacent to operational aircraft as well as in class rooms when necessary.

About 300 enlisted specialists and 30 liaison officers have directed, to date, about 40,000 Air Force officers, enlisted men and civilians in tactical training, servicing, and transport organization within the United States. This method of instruction might be an asset to airline operation procedure in the post-war period.



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Air Transport Plans Cover Short Flights

by L. WELCH POGUE
Civil Aeronautics Board

▪ **1945 War Engineering-Annual Meeting**

(Excerpts from paper entitled "Local Air Service Program")

EQUIPMENT in the local air service field will not be needed until authorizations to conduct this service have been granted by the Civil Aeronautics Board. Once this happens, however, the question arises from what source this equipment will be obtained.

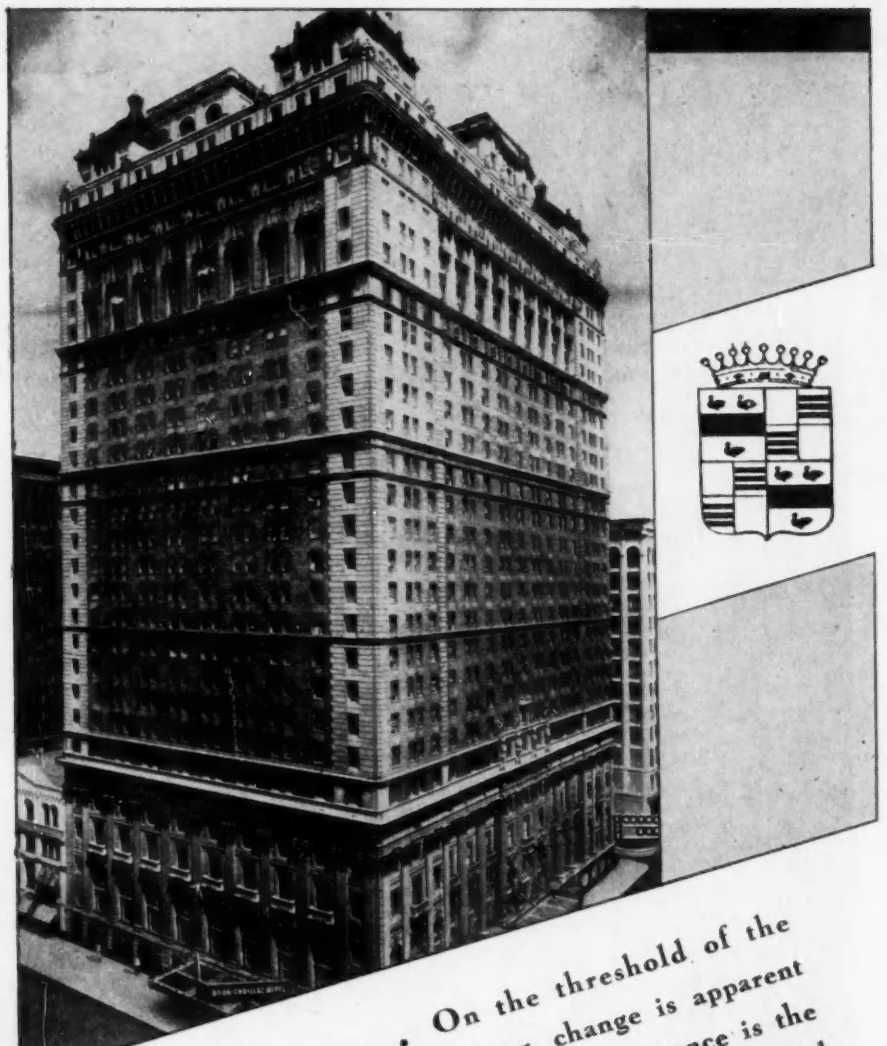
To the limited extent that larger equipment, such as the C-47 and C-60 types, can be used for local services, there will no doubt be an adequate surplus from which to choose; but beyond that there is the problem of suitability of Army versions of smaller cargo planes, and whether such cargo types as may be found suitable will be available as surplus at an early enough date to be significant in connection with this local service program.

It is therefore a fair deduction that most orders will be placed with factories. [illegible] that is done, time will be required for the production of new types and for their testing and certification.

At present, there are 11 regional areas with applications before the C.A.B. which involve proposals covering new air transportation services throughout the United States. In reaching decisions in these 11 proceedings, important issues will have to be settled by the Board. To some extent the Board has resolved certain issues in this field in an opinion of July 11, 1944, when it pointed out that short-haul and local service with aircraft will be mostly an experimental operation. The Board decided to authorize this type of service "under certain safeguards for the overall economy of our air transportation system," the safeguards being (1) to limit such authorizations to temporary periods; and (2) to confine such authorizations to operations which show a justifiable expectation of success at a reasonable cost to the Government.

The Board rejected the Examiners' recommendation that a general rule be established to the effect that the amount of mail compensation payable on local services would not exceed 25¢ per mile, since various factors, including the nature of the services to be rendered and the type of equipment to be used will be influential in fixing the rate.

While the establishment of scheduled local air service would bring the benefits of air transportation to millions of people, nonscheduled air transportation might better meet, for a while at least, the requirements of small communities. The operation of such nonscheduled services might be able to satisfy needs for air service to many small cities at the same time they were testing the market for the successful operation of regularly scheduled services. The type of service offered could be keyed to the growth and character of the demand.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. . . LOW RATES On Air Cargo Invite Trade

by CARLOS WOOD and A. B. CROSHERE, JR.
Douglas Aircraft Co., Inc.

▪ **1944 National Air Cargo Meeting**

(Excerpts from paper entitled "A Proposal for the Establishment of Commercial Air Cargo Service")

AT present, air cargo is a small-scale endeavor, and based on a given level of business conditions, it will stay small unless rates are reduced.

Post-war airplanes capable of operating at low rates will not be available for some time, due to wartime pressure on design and manufacturing organizations, but surplus cargo airplanes are available that may be modified to permit operation at rates permitting a 50-fold increase in air cargo over present levels.

One version is the DC-3 type cargo plane, equipped with presently installed engines of the Pratt & Whitney SK3-G type, which will be capable of operating at a direct cost of 33¢ per plane mile. At an overhead el

85%, this airplane could be operated at an overall expense of 61¢ per airplane mile.

Another version considered is equipped with advanced-type engines with water injection, in order to permit operation at higher gross weights. Structural and performance safety considerations limit the take-off weight to 29,000 lb instead of the present 25,000 lb. This surplus DC-3 appears capable of operating at a direct cost of 34.1¢ per plane mile. This would place the overall expense at 63¢ per airplane mile.

While institution of all-cargo service results in a considerable reduction of possible rate level, use of the surplus DC-3 aircraft at present operating weights will not allow an appreciable reduction of cargo rates.

If we are serious about making air cargo a large-scale public utility that can operate healthily, plans with immediately following operations must get under way in the very near future. These plans should take advantage of the utility of available surplus cargo aircraft properly modified so as to operate at high weights, thus making possible the stable and low level rate structure that is required to attract business and accelerate the growth of air cargo.

It is also advisable to benefit from the flexibility of design incorporated in new airplanes to permit additional operations at low cargo rates which will assist in the stabilization of passenger fares at a reasonable level.

ABUNDANCE . . . Viewed as Antidote For Socialization

by JOHN H. VAN DEVENTER
Iron Age

▪ *Detroit, April 23*

(Excerpts from paper entitled "Great Expectations versus Realities")

IN industry great expectations must be earned individually through constantly increasing efficiency and productivity.

The misconception of work as a right to have a job regardless of the social value of the work performed in that job, together with the expectation of more reward for less effort in our post-war economy, is one of six pressures being felt in this country and Great Britain.

Pressure number two is confiscatory taxation. In the United States most of our successful companies are already paying 90% of most of their profits to the Government. In the United Kingdom it is 100%. Emerging from this is the fact that Government puts itself in the position to become the principal proprietor of new and future business through the process of draining off private investing power and centering it in the state.

The third pressure is political propaganda here and abroad for the nationalization of industries. Labor, both in Great Britain and America, is bending its efforts in this direction, although thus far the attempt is confined to basic industries such as coal, steel, transportation, and power.

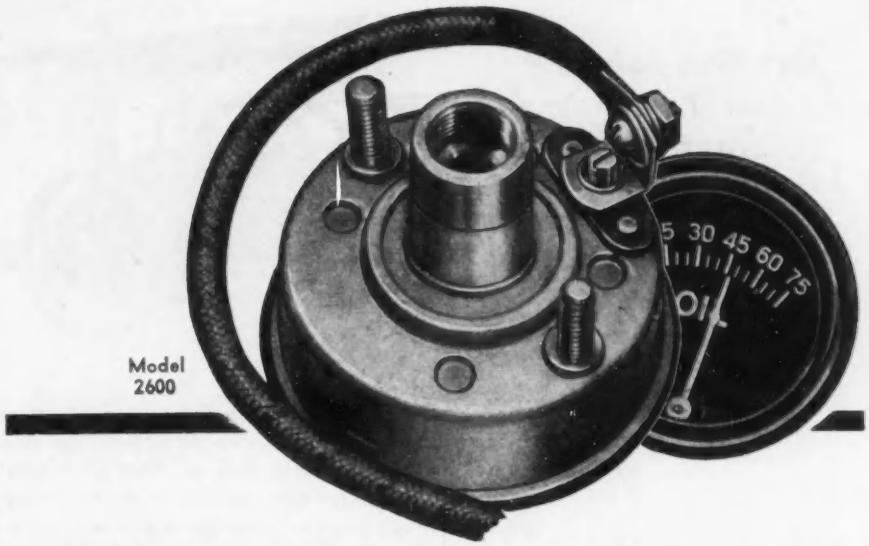
The fourth pressure toward socialization is the proposal to govern international trade by means of cartels. America, like most of the world, has been living in a frozen economy. Jobs, wages, and prices are frozen, and the rigidity of regimentation has encased management, labor, and the public in an icy armor in which progress has been immobilized at the status quo ante.

The fifth pressure is the tremendous growth of state landlords and proprietorship of the means of production taking place here and in England. In Great Britain this has been accelerated because of the destruction of private homes and the need for reconstruction; in this country the trend is seen in slum clearance and emergency housing projects, as well as in many industrial production facilities.

The sixth pressure toward socialization is that of Government financing of higher education.

The job facing those who want to do something about this is twofold; the first part relates to information, the second to action. Convince enough people of what is going on, and action will be forthcoming.

How can private industry and business create the additional employment to keep Government from taking over that function? The only way is by making more goods and services available for more people at lower cost. Particularly must we do a job in reducing the cost of distribution. This is an outstanding problem for post-war management.



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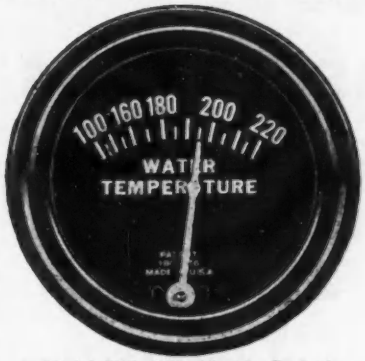

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Vacuum Control Improves Brakes

by T. H. THOMAS and E. R. PRICE
Bendix Aviation Corp.

■ **Cleveland, Jan. 15**

(Excerpts from paper entitled "Automotive Vacuum Brakes")

ONE of the most recently developed units for vacuum brake installations is the Hydrovac, which may be of either the piston or diaphragm type. The function of the Hydrovac is to multiply the hydraulic pressure so that the brakes receive several times as high a pressure as the driver is creating physically in the master cylinder. Because this unit is completely sealed, it is fully protected from dirt, water, and other contamination; no linkage need be adjusted or cleaned.

Internally, the Hydrovac is composed of three major sections:

1. The vacuum power cylinder portion which contains one or more vacuum pistons and a push-rod.

2. The hydraulic slave cylinder portion including a slave cylinder piston, which is pushed by the push-rod and bypass valve which permits the flow of hydraulic brake fluid through the center of the piston while the push-rod is not pushing against the slave cylinder piston.

3. The hydraulically actuated control valve piston, which regulates the pressure difference exerted upon the vacuum piston so that the load applied by this vacuum piston through the push-rod to the slave cylinder piston is always proportional to the hydraulic line pressure being received from the master cylinder.

With the driver's foot removed from the brake pedal and the brakes released, there is zero hydraulic pressure in the master cylinder.

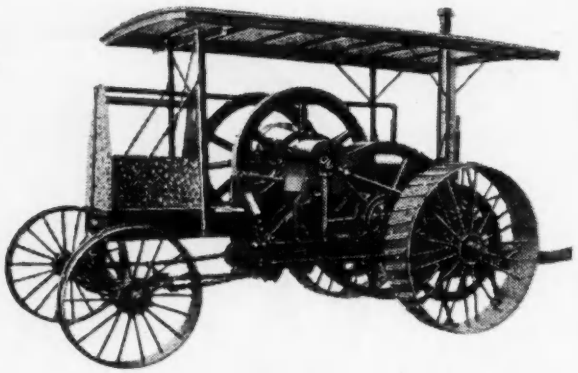
The Hydrovac may also be installed on a tractor – in which case the control line for trailer brakes is connected to the section of the valve which communicates with the cylinder chamber. Thus, the vacuum in this trailer control line decreases and increases proportionately as pressure on the brake pedal is varied.

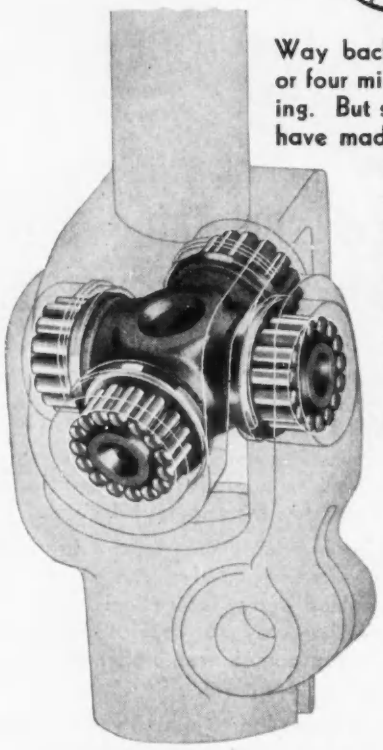
Assume the weight on a semitrailer axle is 15,000 lb; the weight on the rear tractor axle is 15,000 lb; and the weight on the front tractor axle is 4000 lb. Rear tractor wheels slide when brakes receive 1400 psi hydraulic line pressure which occurs when the Hydrovac on the tractor is delivering full power. This requires 70 lb pressure on the brake pedal. Trailer wheels slide at the same or a very slightly lower pedal pressure, because power brake chambers and brake camshaft lever lengths have been selected to obtain such performance.

Just as important as the proper selection of major units is the use of correct sizes of fittings, tubing, and vacuum hose.

The problem of improving brake performance on the highway is one of vehicle operation, maintenance, design of equipment, its selection and installation.

Are the Joints in Your Tractor's Steering Column Out-of-Date ?





Way back when the tractor's top speed was three or four miles an hour, chains could handle the steering. But since rubber tires and anti-friction bearings have made higher speeds possible, steering column designs require joints having roller bearings and lifetime lubrication. MECHANICS 1 RA Roller Bearing Steering Joints, using heat-treated alloy steels, hardened and ground to precision and factory packed with lubricatant for life, provide easy, accurate and long lifed steering . . . without further lubrication. Modern design, utilizing stampings and brazing, results in a price you can offord.

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CARRIER WAR . . . Developing Its Own Techniques

by ARTEMUS L. GATES
Assistant Secretary of the Navy for Air

■ **Detroit, Feb. 5**

(Excerpts from paper entitled "Naval Aviation Today in the Pacific")

AN innovation in naval warfare introduced in the Pacific is the sweep operations. This has enabled us to conduct a continuous naval offensive against the Japanese, using powerful task forces which center in aircraft carriers, to unbalance the triphibious power of the enemy. These task force sweeps get the utmost value from the Navy's air arm.

Freedom of action of the fast carrier forces

would be impossible if it were not for the work of the escort carriers, or baby flattops. By providing air cover in amphibious landings and by protecting transports, landing craft, bombardment ships and other accompanying vessels from enemy submarines, these craft, converted from oilers or merchant ships, free the big carriers to range the sea looking for enemy fleets.

In a recent engagement one of our fast carrier task forces remained away from its base for nearly two months, refueling and re-arming at sea during this unprecedented period. This is evidence that our striking units now have the means to range great distances from home and maintain their maximum strength for repeated blows.

Another innovation is that this year the plane complements of the Essex class carriers have been altered to include a large number of fighter-bombers. Henceforth, carriers of this class will carry a much augmented squadron of fighter planes which have been fitted out as fighter-bombers. These fast planes are capable of carrying a 1000-lb bomb at 400 mph within a limited range.

The Navy Department is also ready to announce that a new jet-propelled fighter plane is already in production and will soon be ready to join the fleet.

Despite our many creditable advances, the Japanese are still a powerful and well-equipped adversary. Their production of aircraft has steadily increased, and they are determined to fight us to the end.

Passenger Planes Face Competition On Short Flights

by H. E. NOURSE
United Air Lines

▪ *1945 War Engineering-Annual Meeting*

(Excerpts from paper entitled "Defining the Market for Local Air Transport Service")

IN analyzing the market for local air passenger transport, the following generalizations were made by a group of researchers from our company:

A high proportion of out-of-town travel from small cities is short-haul travel, and people residing in small cities not only travel shorter distances, but travel more often than those living in larger cities.

A large proportion of out-of-town trips are by private automobile. The shorter the trip the more important is the automobile as a travel medium; the smaller the city, the greater is the relative importance of private automobile travel in comparison to common carrier travel. The larger the city, the more trips over 50 miles made by common carrier.

The airplane as yet has not had an opportunity to compete in this short-haul market. The extent to which it can compete in the future will depend on the extent to which air travel can compare favorably with other travel mediums in respect to certain fundamental requirements for local service, which are: accessibility of service; frequency of service; speed of service; and cost of service.

Air service provided from airport to airport is generally less accessible to the traveler than service afforded by rail or motor carriers or by private automobile. Time consumed by the trip from city to airport at origin, and airport to city at destination, has no equivalent in the use of other forms of transportation. This constitutes an obstacle which can be overcome only as long as air travel is to and from airports located on the outskirts of cities.

Surface carriers will offer a very real competitive element to local air transport service in frequency of service between points.

If the total elapsed time, including both flight and surface time between airports and city centers, is given proper weight, the overall speed of air travel does not offer great advantage as a time saver on non-stop distances up to 75 miles.

If air fare as well as surface transportation cost between airport and city centers is considered, local air transport cannot compete with rail coach, bus or private auto costs on an equal basis.

In light of these generalizations, it appears the passenger market for air transport will be defined on the short side at minimum distances between 75 and 100 miles – until, at least, the airplane can compete more effectively at short distances with other transportation mediums.

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Hallett Fittings have proved their superior quality in practically every important amphibious invasion of enemy territory during World War II . . . doubtless the most grueling service to which equipment of any type ever has been subjected. Now available for every type of transport engine.
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HALLETT FILTERED IGNITION SHIELDING

Simplicity Abets Aircraft Economy

by R. L. ANDERSON
Chicago & Southern Air Lines, Inc.

▪ **Kansas City, Nov. 17**

(Excerpts from paper entitled "Effect of Airplane Design on Air Transport Maintenance")

GREATER utilization of equipment and simplified practical aircraft design will do much toward reducing operating costs and thereby bring the air transport industry close to the goal that has been set up for it to gain.

However, several items must be given full consideration in the original design to insure the ultimate in utilization and efficient maintenance of transport aircraft, which are as follows:

1. Engine nacelles must be designed to permit change of power units in not over 30 min, and must be installed either on the right or left side of two-engine aircraft or any of the four positions on four-engine types. This will automatically permit reduction in required spare engine nacelles for service protection and thus contribute to improved economies by reduction in capital investment.

2. As much as possible full inspection of all critical structure and controls must be permitted without removal of major components.

3. Landing gears must be removable and replaceable as assemblies, and when feasible should be interchangeable right and left. This must also be true of wheel and brake assemblies.

4. Adequate radio installation and control facilities must be provided and designed for ease of equipment exchange and service of that part of the control installation not removable for service.

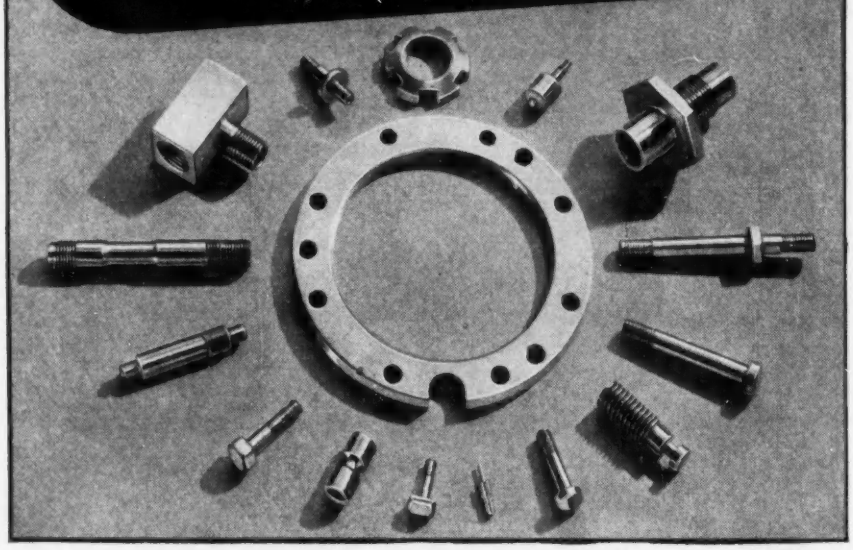
5. Instrument panel installations should be removable for service and overhaul as assemblies or subassemblies, all electrical connections being broken with multiple terminal plugs and all plumbing manifolded for quick disconnect.

6. Cabin interiors of present aircraft are proving to be the bottleneck in many maintenance programs by requiring greater service time for full reconditioning and service than any other major component part of the airplane.

Much can be accomplished in improved maintenance by giving more consideration in the original design to the service and overhaul problems of cabin interiors. Quick-change interchangeable seat assemblies, removable buffet sections and interchangeable rug sections are a few of the improvements that can be made.

Producing the transport airplane in a practical design with a minimum of complexity will insure the operator a work unit at the lowest capital investment, and one that may be operated with a maximum of utilization, efficiency and economy.

What kind of SCREW MACHINE PRODUCTS do you need?



Regardless of the number of intricate finishing operations required to complete the Screw Machine Products you need—you will find The Chicago Screw Company a dependable source of supply . . . For over 73 years we have specialized in the manufacture of screw machine and cold upset products in *any size, any shape* and in unlimited quantities.

All secondary operations are performed in our vast factory, and include Milling, Drilling, Broaching, Grinding of any type—precision Thread Rolling, Hydrogen Brazing, Electronic Heat Treating—all are accurately and rigidly controlled from rough stock to finished product.

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POWDER . . . Metallurgy Affords Various Advantages

by RAYMOND B. AUFMUTH
S. K. Wellman Co.

▪ **Cleveland, March 12**

(Excerpts from paper entitled "The Practice of Powder Metallurgy")

MOST metal powders used on a large scale are produced by the following methods:

1. Electrolytic deposition, whereby metals can be produced in powder form, as a soft sponge or as a hard, brittle deposit by various current densities.

2. Atomization is the process for powders having relatively low melting points, such as zinc, lead and aluminum.

3. Reduction of metal salts or oxides by gases below the melting point is used in producing metal powders of copper, iron, nickel, chromium, and tungsten.

4. The hydride process is used for production of high melting point metals, such as titanium, tantalum, and zirconium.

Particle size distribution is important in that the filling of molds is random packing, and with this method voids are appreciable.

Particle size and shape are governed by the method of producing the powder. After the powders have been selected for specific applications involved, they are mixed or blended together.

This mixture of powders is usually compacted at room temperature in hydraulic or mechanical presses. Prior to this pressing, the metal powder is molded to the desired shape either in separate molds or in dies that are mounted on the press. The pressure used in forming the compact is determined by the physical properties of the powders and also tends to determine the physical characteristics of the sintered material. The sintering operation is done in sealed furnaces in the presence of a reducing, inert, or neutral atmosphere. The temperature used is determined by the metal powders and the properties desired of the product.

Some of the advantages that can be achieved with metal powder applications are:

1. The composition of the mix can be controlled and reproduced without losses common to other metallurgical processes.
2. Certain properties and physical characteristics as well as compositions can be obtained that are unobtainable otherwise.
3. A tremendous saving in loss of material is secured by using metal powder parts in preference to machined or cast parts because no excess material need be allowed for machining.
4. Tooling costs are lower and there is a saving in labor.

There are also many limitations to the use of metal powder parts. For example:

1. Die casts outshine metal powder parts in respect to cost if the quantities involved are not sufficient to cover tooling.
2. Sintering furnaces are a liability as well as an asset in that new applications being tried require higher temperatures and pressures. The change in dimensions during sintering must be accurately controlled, and this is a difficult achievement in present furnaces.
3. Very large friction members must be made in segments rather than the large presses, thus limiting the size of the product.

COCKPIT DESIGN REQUIRES STUDY

by DR. ROSS A. McFARLAND
Harvard University

• 1945 War Engineering-Annual Meeting

(Excerpts from paper entitled "Psychological and Physiological Aspects of Cockpit Engineering from the Pilots' Viewpoint")

AN analysis which has been made of the problems relating to the use and operation of the controls and instruments in the cockpit, as well as visibility from the control cabin and illumination of the instrument panel has resulted in the following observations:

1. Overall arrangement of the crew stations in large aircraft requires functional grouping so that crew members can work as a unit in continuously furnishing information to the captain. Those factors to be emphasized are: access to all stations without obstructions from traffic; adequate visibility for the engineer to observe motors and propellers in flight; and comfortable seating arrangements for each crew member.
2. It is necessary to consider physiological variables influencing dark adaptation and visual acuity under low illumination.
4. Visibility from the cockpit should be studied from the viewpoint of range and field of view; especially the effect of structural limitations in the windshield. Attention should be given to distortion of vision due to increased thickness of glass brought about by birdproofing and defrosting designs.
6. Various methods of weatherproofing of windshields, such as wipers, anti-icing fluids, heat and infra-red light may adversely affect the vision of the pilot. Emphasis should be placed on adequate design, as well as on cleaning the windshields to maintain maximum visibility.
7. Regarding arrangement of dials on the instrument panel, the following principles are suggested: ease of visibility of the essential instruments for both pilots; simplification of the pilot's panel by relegating instruments relating to powerplants to the engineer; and grouping so as to limit the range of eye movements while looking at essential dials.

ARE YOU CONSIDERING THE USE OF
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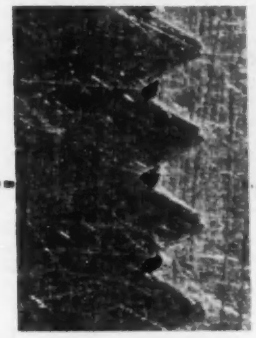
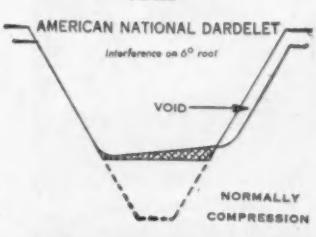
MAGNESIUM
IN YOUR NEW PRODUCT?



American National Thread

American National Dardelet Thread



When the original "V" form of thread came into use these metals were unknown in industry.

The use of the new American National Dardelet is of particular advantage in these lighter metals.

- Does not gall in assembly.
- Does not fret from lateral motion.
- Does not require selective fits.
- Does not loosen and back out.
- Threads can be sealed if desired.
- Stronger in tension and torsion.
- Materially increases fatigue life.

Contact is made on a wide 6° root rather than on flanks. Gaging, therefore, is simplified.

In production National taps and gages may be used without change. Threading tools and snap gages require minor changes only.

DARDELET THREADLOCK CORP.
2832 E. Grand Blvd. Detroit 11, Michigan.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between May 10, 1945, and June 10, 1945.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: Capt. Edgar H. Berg (SM), William H. Nahm (M).

Canadian Section: Stewart Wallace Irvine (J).

Chicago Section: Sanford L. Beckwith (A), Charles Howard Brunell (J), Guy B. Child (A), Edmond B. Cooper (J), Seymour Edward Heymann (J), Elmer Larned (M), Edward C. Myers (M).

Cleveland Section: Stanley P. Bayless (A), William J. Borchardt (J), Karl R. Feise (J), Donald George Hilligoss (J), Andrew D. Hodge (M), John W. Tatter (M), John E. Ullman (M), Edward Wolf, Jr. (J).

Colorado Group: Strawn Armstrong (A).

Dayton Section: Lawrence Eugene Balch (M), Paul E. Morgan (J), Alexander Sherman (J).

Detroit Section: Albert D. Baker (M), Charles O. Bickert (A), Lyle E. Calkins (A), Raymond W. Drobisch (M), Robert Max Ehlert (J), Harry Veiling Elkner (A), Blaine E. Eynon (A), Roland E. Gegoux (M), Lt. Michael T. George (J), Robert H. Gibson (A), Edmond J. Godin (J), W. H. Hammond (A), Alex. Hardy (J), Donald Harshman (J), R. B. Harvey (A), Henry Warren Jones (A), Sigmund Kloniecke (J), Carroll J. Lucia (J), Alexander A. McCormack (M), Thomas F. McGuane, Jr. (M), Raymond J. Nymberg (A), Peter W. Perish (M), Bernard A. Peterson, Jr. (J), Harvey Harold Pollack (A), Peter Herget Ponta (M), M. S. Rosenberger (M), Elmer G. Schubert (M), Francis J. Sehn (J), Edward Shouskey (J).

Hawaiian Section: Arthur R. Allen (A), Edward C. Alexander (A), Roy A. Craw, Sr. (A), Blaine E. Eisert (A), Emmett T. Grumbling (A), Martin F. Grune (A), J. C. Hardy (A), Thomas T. Iwasa (A), W. J. Maze (M), George Yoshio Morita (M), William Maynard Pearson (J), Arthur F. Wallace (A), K. M. Watson (M).

Indiana Section: J. H. Coover (A), Daniel B. Worth (M).

Kansas City Section: H. E. Toot (M).

Metropolitan Section: Eugene Frederick Baird (J), Robert Joseph Bigley (A), Milton H. Clapp (M), Edward N. Cunningham (M), Dudley D. Fuller (M), Capt. Fred A. Jacoby (A), John Francis McEnerney (A), Arthur W. Miller (J), Motor Haulage Co., Inc. (Aff.), Representative, Raymond Francis Morelli. Hyman S. Schwartz (A), S. J. Steven (M), Emery I. Valyi (M), David Wark (J).

Mid-Continent Section: Robert W. Henry (M), Geo. W. Cupit, Jr. (M), James Monroe Stevenson (M).

Milwaukee Section: Albert J. Miller (J), Noble Sherwood (M).

Mohawk-Hudson Group: Gene O'Haire (A).

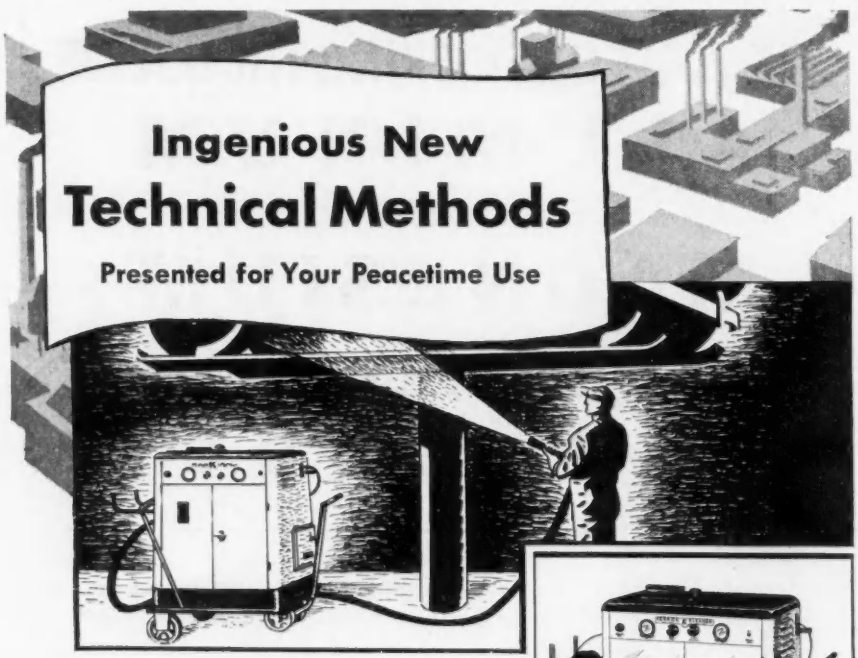
New England Section: Robert T. Holland (J), H. E. Marvill (M).

Northern California Section: Ernest Seymour Starkman (J), Stanley S. Sorem (M).

Oregon Section: Harvey Byron Van Raden (A).

Peoria Group: George H. Gearhart (J), Theodore Dewey Guile (A), Ivan E. Howe-

cont. on p. 48



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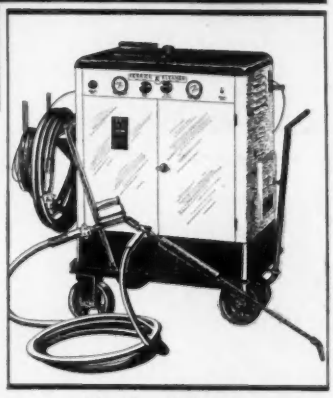

The Kerrick Kleaner

Coming to Users of Gas-Powered Equipment

80% SAVINGS IN CLEANING TIME

With Steam Rig Now the Army's Standby

An economical solution to the problem of cleaning and degreasing trucks, passenger cars, tractors, locomotives, excavators, and the like will be available to garages, service stations, all users of oil-burning equipment, as soon as war demands permit. It is a more efficient steam cleaner now in use by the thousands in the Armed Forces.

Neat "housekeeping" has too often been neglected by industry due to the costliness of hand labor. But the best housekeepers in the World, the U. S. Army, Navy and Marine Corps, dare not neglect frequent and thorough cleaning of all equipment to safeguard against fire and malfunctioning, and to permit fast, certain inspection. This cleaner, developed to meet their high standards, removes grease, dirt and grit 5 times as fast as any other method. It cleans by a balanced combination of heat, detergent, water and friction. It is typically "army" in simplicity of design and operation; in 30 minutes, the entire machine can be dismantled and completely cleaned.

Wartime uses of Wrigley's Spearmint Gum also point the way that industry may benefit when this quality product again becomes available. It will *again* be a "help on the job" in many ways. Right now *no* Wrigley's Spearmint is being made, as present conditions do not permit the manufacture of Wrigley's Spearmint in quantity and quality sufficient for all. But remember the Wrigley's Spearmint wrapper—it is a certificate of highest quality and flavor—and will always remain just that.

You can get complete information from Clayton Manufacturing Company, Alhambra, Calif.

Remember this wrapper

Z-74

APPLICATIONS Received

The applications for membership received between May 10, 1945, and June 10, 1945, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Baltimore Section: Lt. Werner Henke.

Buffalo Section: Donald G. Zimmerman.

Canadian Section: William Munro Gibson, R. P. Frey, R. Norman Graiger, E. Grayson Hay, Malcolm P. Jolley, Albert Jude, James M. Law, Ralph P. Warriner.

Chicago Section: Ralph C. Archer, Clarence H. Brown, Harry Cornell Bunnin, Gilbert Fritz Carlson, Alfred F. Jaeschke, George Kende, Lawrence R. Lyons, Albert A. Orne, Jr., Harry Albert Pearman, William L. Rodgers, C. A. Sprague, Clarence Youngsma, Chet A. Zielin.

Cincinnati Section: Harold W. Couper, John A. Fox.

Cleveland Section: Henry C. Barnett, Robert H. Davies, Ben F. Jones, Robert M. Markley, John F. McClenahen, W. H. Redhead, Joseph A. Rizzo, Carl Severin, Virgil L. Snow, Max Alden Swikert, David Baker Wood.

Colorado Group: Edward L. Cody, Jack P. Shoup.

Dayton Section: Roy C. Boden, Ernest E. Cleveland, Jr., Lt. Ralph J. Eschborn, Garthwood R. Taylor, Clifford B. Wright, Francis M. Wright.

Detroit Section: Edgar B. Brown, Cecil C. Buckner, Ernest V. Bunting, Orville Craig Fay, F. T. Holland, Herbert H. Holmes, Kenneth L. Hulsing, George C. Husbands, Sr., Richard E. Karvonen, George Paul Loweke, Jack H. McNulty, Edward C. Mertz, Glennard T. Olson, Herbert L. Schnell, Lawrence H. Skromme, Fred C. Stromatt, James T. Wilson.

Indiana Section: Earl Arthurs, William Rayfield Johnson, Charles W. Ostertag, Lt. Edward B. Salmon, Medard J. Spencer, Carl J. Thrailkill.

Metropolitan Section: Jacques A. Arbouet, Donald E. Drake, Bob N. Fassoulis, Frank K. Fraser, Herbert W. Fingerhut, W. Kenneth Houpt, Edward H. Jacobs, Frank G. MacNabb, Lt. Arthur Paul McCabe, William E. Morris, Marcel Piry, George Plossl, William Schinabel.

Mid-Continent: Carl R. Bartholomew, Wade M. Johnson, Harold T. Quigg, Thomas Chalmers Tweedie.

Milwaukee Section: Darryl W. Johnson.

New England Section: John Bouwmeester, Shiao Pin Loh, Edgar D. Yule.

Northern California Section: Allan G. James, Joseph S. Martin, Henry A. Strzelecki.

Northwest Section: William F. Dunlap, Clifford E. Plouff, O. A. Riggs, W. W. Williamson.

Oregon Section: Russell B. Nelson.

Peoria Section: Harold F. Stenstrom.

Philadelphia Section Capt. Valentine John Sharkey, Norman S. Waner, Frank D. Warner, Jr.

Pittsburgh Section: Watson C. Adams, H. Kenneth Siefers.

St. Louis Section: Wallace Hopper.

Salt Lake City Group: David Brown.

Southern California Section: Charles H. Barnes, Philip R. Baus, George Charles Beame, Joyce J. Charles, John L. Colp, Jack R. Conaway, Albert Lee Cook, W. L. Craven, David C. Eaton, Vincent W. Eckel, Frank S. Galpin, Leonard E. Hobby, Stanley

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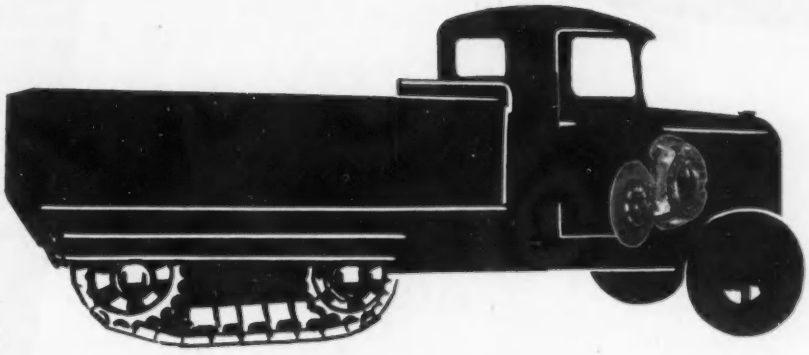

If the products you are redesigning for the post-war market will benefit from better conforming CLUTCHES, our engineers can give you timely help. You can utilize their extensive, war-tested clutch designing, building and applying *knowhow* to simplify your redesigning and to strengthen the competitive position of your new products.

SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.

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316 Catherine Street, Rockford, Illinois, U.S.A.

T. Horn, Lawrence W. Johnson, Major Walter Stuart Johnson, John Patrick Johnston, E. D. Krentzman, Arthur H. Kuriloff, Charles B. Large, William Albert Lester, William A. Lippman, Jr., Rodney C. Magner, Leonard E. Miles, Dwight M. Moore, Fred H. Rohr, Sgt. Stanley T. Urbaniak, Chandler C. Ross, LeRoy Gerald Smith, Paul C. Swan, Raymond J. Woods.

Southern New England Section: Simon T. Mitchiner, Jr., Frederick Thodal, Alexander M. Watson.

Spokane Group: Albert M. J. Pohl.

Syracuse Section: John C. Gibb, Joseph A. Mehlek, Samuel K. Wolcott, Jr.

Texas Section: Frederick Bell, Jr., Robert L. Curtiss, Wesley P. Red, Noah J. Reynolds.

Twin City Group: Melvin I. Knutson, John O. Tews.

Washington Section: John B. Dydiw, Mou-Che Liu.

Western Michigan Section: Douglas W. Bond.

Outside of Section Territory: Benjamin H. Adams, Seth E. Aldridge, Albert William Allbright, Albert C. DeMotte, James Stanley Longdon, James Leonard Middleton, James J. Och, John Doane Wicks.

Foreign: Jurig Koffman, England; Charles Jose Richard Meelboom, Argentina; John Dudley North, England; Lynn M. Phillips, Mexico; William Christian Stoddart, England; John Edward Whatmough, England.

Meetings Papers

MIMEOGRAPHED copies of PAPERS presented at SAE National & Section Meetings during the past 12 Months, are available NOW.

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SPECIAL PUBLICATIONS DEPARTMENT
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29 West 39 Street, New York 18, N.Y.

New Members Qualified

cont. from p. 46

ard (A), Albert C. Neubauer (M), Robert Bruce Underwood (A).

Philadelphia Section: Earl Geo. Bennett (M), Carl A. Jacobson (M), Jacob L. Pauly (J).

Pittsburgh Section: Frank W. Godsey, Jr. (M).

St. Louis Section: Joe A. McCartney (A).

Southern California Section: Leslie H. Appel (M), Floyd A. Baker (A), Ralph E. Birnbaum (A), John B. Black (M), Frederick William Dadson (A), Alfred E. Doherty (A), Robert Gordon Gustavson (J), William Hangliter (M), Walter C. Hurty (M), John Intlekofer (J), W. Sheldon Keefer (A), (Miss) Jane Little (J), Eugene William Martin (A), William Ralph Mayhew (A), Robert Stanley Thompson (J).

Southern New England Section: H. M. Sauers (A).

Spokane Group: Walter Chris Hoegh (A), J. C. Jameson (A).

Texas Section: Geo. F. L. Bishop (M), John F. Stewart (M).

Twin City Group: J. L. Becker (M), Ralph Ervine Jones (M).

Washington Section: Com. William Wheeler Brown (SM), Robert Edison Fulton, Jr. (M), Robert Morton Giltin (J), Hugo H. Haas (SM), Leon J. LaFontaine (M), E. K. Owens (A), Lt.-Com. Neil A. Smith (M), A. Burks Summers (A).

Western Michigan Section: Vincent M. Drost (M), Willis R. Johnson (A).

Outside of Section Territory: Hayden Coryell (A), Joseph M. Gwinn, Jr. (M), William J. Higgins (A), Albert L. Jacobs (J), John V. Johansen (A), Elwood LaVerne Larson (A), E. M. Lowery, Sr. (A), Capt. Eric Walter Mole (A), G. E. Ritter (A), Arthur L. Schultz (A), Charles E. Starr, Jr. (M), Percy A. Wood, Jr. (J).

Foreign: Gerald F. P. Fox (FM), England.

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BEARINGS: HYATT

It is with considerable pride that we are able to include several of the Allison-powered fighting planes among the famous aircraft with Hyatt equipment.

In the Allison engines Hyatt Precision Roller Bearings are used on the propeller reduction gear drive and starter and generator drive shafts which also function in driving other accessory units.

Dependable Hyatt Roller Bearings also serve in other aircraft engines as well as in starters, superchargers and propellers.

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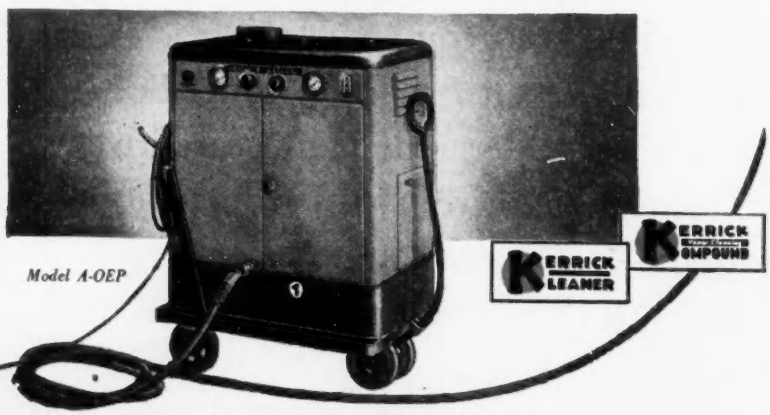
Harrison, New Jersey • Chicago • Detroit • Pittsburgh • Oakland, California

"It's KERRICK FIVE to ONE"

One man, with a Kerrick Kleaner, can do more and better heavy cleaning than *five* men working any other way.

In these days, when tractors, trucks, farm equipment and all machinery must give extra service, and still last longer, it has to be overhauled more often and the first requirement is to get it thoroughly cleaned.

Kerrick Kleaners combine steam, water, pressure and detergent to remove the most stubborn dirt and grease from motor vehicles, shop equipment, parts or complete buildings . . . leaving the surface clean and dry for inspection or repair. For complete information, please ask for the catalog describing the new Model A.



Model A-OEP

CLAYTON MANUFACTURING CO.

ALHAMBRA CALIFORNIA

About SAE Members

cont. from p. 21

C. M. BERRY is now manager of the "Hi" Lewis Oil Co., Kansas City, Mo. He was formerly field engineer, Ethyl Corp., North Kansas City, Mo.

Formerly field service representative, Wright Aeronautical Corp., Paterson, N. J., **KENNETH B. OWINGS** is now associated with the Warren Refining & Chemical Co., Cleveland, Ohio.

Formation of the Society of Industrial Designers with **RAYMOND LOEWY** as chairman of the executive committee was announced recently. The goal of the Society is to "establish criteria for ethics, training and practice." Temporary headquarters of the Society will be at West Forty-second Street, New York City.

Previously at the General Ordnance School, Navy Yard, Washington, D. C., **N. F. RATHER, USNR,** has been transferred and may now be reached at the Naval Supply Depot, Bayonne, N. J.

NORTON B. MOORE is now manager of the research department for Aerojet Engineering Corp., Pasadena, Cal., and is also consultant on the staff of the Southern California Cooperative Wind Tunnel. He had been associate director of research, Curtiss-Wright Corp., Airplane Division, Buffalo, N. Y.

WILLIAM C. GOULD has recently been appointed sales manager of the marine department of Detroit Diesel Engine Division of General Motors Corp., where he will supervise national distribution and sales of "Series 71" marine diesel engines. Mr. Gould was formerly field service manager with Allison Division of General Motors Corp.

Formerly factory manager, Baltimore Enamel Co., Baltimore, Md., **CHARLES C. WEBB** is now with the research group, Mechanical Development Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

EVAN S. PRICHARD, who had been chief engineer, Tricoach Division, Pacific Car & Foundry Co., Renton, Wash., is now affiliated with the Cook Bros. Equipment Co., Los Angeles, Calif., in the same capacity in the Equipment Division.

Formerly chief aeronautic engineer, Hartwig Aircraft, San Antonio, Tex., **DAVID J. LITTLE** is now serving as a design engineer with the Detroit Gear Aircraft Division of Borg-Warner Corp.

Previously an SAE student member at the Detroit Insitute of Technology, **ROBERT KAMIENIEC** is now a private in the U. S. Army and is stationed at Camp Wolters, Tex.

H. W. BUTTERBAUGH has returned to the American Brass Co., Kenosha, Wis., as assistant manager. He left there in 1945 to join Basic Magnesium, Inc., New York City, as research engineer.

ROBERT McLARREN, who had been managing editor, Air Age, Inc., New York City, has been appointed technical director, public relations, Aeronautical Chamber of Commerce of America, Inc., Washington, D. C.

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